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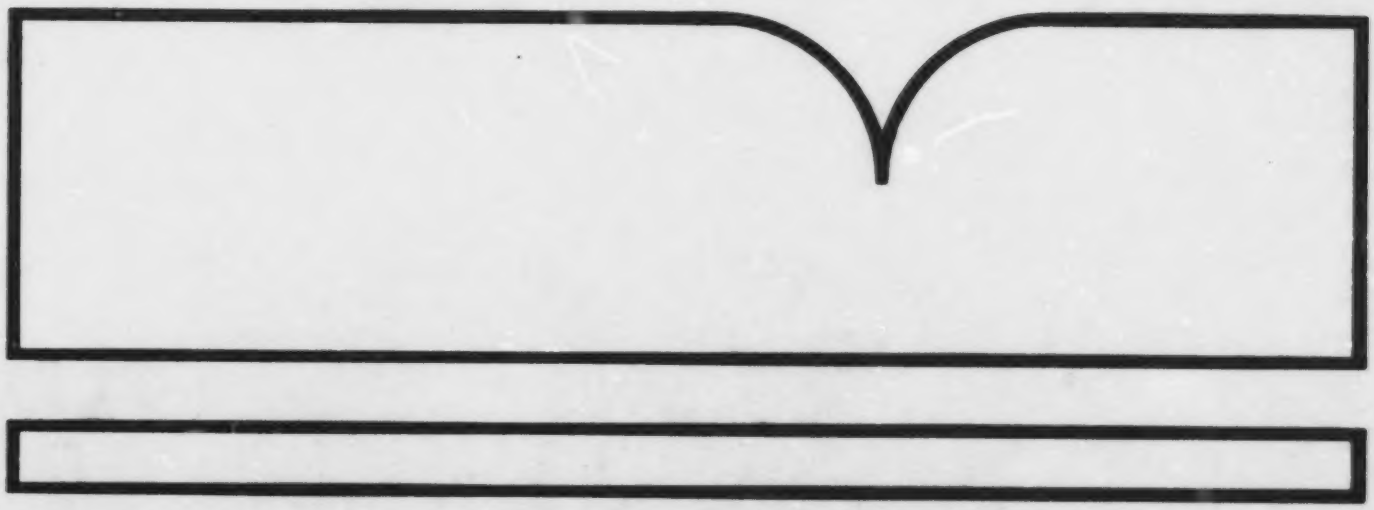
Fugitive Emission Sources and Batch Operations in Synthetic Organic Chemical Production

IT Enviroscience
Knoxville, TN

Prepared for

Industrial Environmental Research Lab.
Cincinnati, OH

May 81



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May 1981

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FUGITIVE EMISSION SOURCES AND BATCH OPERATIONS IN SYNTHETIC ORGANIC CHEMICAL PRODUCTION

by

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Task No. 7014

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Industrial Pollution Control Division
Industrial Environmental Research Laboratory
Cincinnati, Ohio 45268

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OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
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16. ABSTRACT

This survey report was developed for the EPA for use in assessing the potential magnitude of fugitive volatile organic compound (VOC) emissions from agitator seals, cooling towers and batch operations in the production of 378 designated chemicals.

The information presented in this report has been developed based on a review of the available open literature. Included in this review were published articles and reports, selected state air emission inventory questionnaires, and trip reports from visits to specific plant sites. Information on the type of operation, i.e., batch or continuous, and the quantity of specific fugitive source types associated with each process was evaluated and overall industry estimates were made. Tabular groupings were developed and are presented for each of the designated chemicals in Part A of this report. A qualitative assessment of miscellaneous fugitive VOC emissions unique to batch operations is presented in Part B of this report.

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Volatile Organic Compounds (VOC) Fugitive emissions organic chemical production	batch processing VOC (volatile organic compound)	

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FOREWORD

When energy and material resources are extracted, processed, converted and used, the related pollutional impacts on our environment and even on our health often require that new and increasingly more efficient pollution control methods be used. The Industrial Environmental Research Laboratory Cincinnati (IERLCi) assists in developing and demonstrating new and improved methodologies that will meet these needs both efficiently and economically.

This report, "Fugitive Emission Sources and Batch Operations in Synthetic Organic Chemical Production" presents an initial data base for certain types of previously unquantitied sources of fugitive volatile organic compound (VOC) emissions from the synthetic organic chemical manufacturing industry (SOCMI). One type of fugitive emissions problem studied was the use of batch operations in organic chemical production, since it is known that batchoperated facilities have unique fugitive VOC sources as compared to continuously operated facilities. Other fugitive emission sources studied were agitator seals, and cooling towers that recirculate process water contaminated with VOC. This report provides an approximate assessment of the prevalence of these types of fugitive VOC sources, to assist in defining further research needs.

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Cincinnati

ABSTRACT

This survey report was developed for the EPA for use in assessing the potential magnitude of fugitive volatile organic compound (VOC) emissions from agitator seals, cooling towers and batch operations for the 378 designated chemicals that comprise the synthetic organic chemical manufacturing industry.

The information presented in this report has been developed based on a review of the available open literature. Included in this review were published articles and reports, selected state air emission inventory questionnaires, and trip reports from visits to specific plant sites. Information on the type of operation, i.e., batch or continuous, and the quantity of specific fugitive source types associated with each process was evaluated and overall industry estimates were made. Tabular groupings were developed with computer assistance and are presented for each of the designated chemicals in part A of this report. A qualitative assessment of miscellaneous fugitive VOC emissions unique to batch operations is presented in Part B of this report.

This report was submitted by IT Enviroscience, in fulfillment of contract No. 68032568 under the sponsorship of the U.S. Environmental Protection Agency. This report covers the period from December 1979 to April 1981.

CONTENTS

Page

Disclaimer..... ii
Foreword.....iii
Abstract..... iv
Tables and Figures..... vi

PART A - SOCMI BATCH OPERATIONS/FUGITIVE SOURCES SURVEY

I. INTRODUCTION..... 2
II. METHODOLOGY..... 3
A. Data Collection..... 3
B. Data Evaluation..... 5
III. RESULTS..... 8
A. Batch Operations Survey..... 8
B. Equipment Usage..... 9
IV. SUMMARY.....11
V. RECOMMENDATIONS.....12

PART B - MISCELLANEOUS SOURCES OF FUGITIVE VOC EMISSIONS FROM BATCH OPERATONS IN SOCMI

I. INTRODUCTION.....14
II. BATCH EMISSION SOURCES.....15
A. Displacement Emissions from Fluid Movement.....15
B. Displacement Emissions from Temperature Changes.....15
C. Displacement Emissions from Pressure Letdown.....17
D. Emissions from Inert-Gas Blanketing.....20
E. Emissions from Equipment Openings.....20
III. CONTROL TECHNOLOGY.....24
A. Add-On Controls.....24
B. Operating Practices.....26

APPENDIX A. RESULT TABULATIONS.....25

APPENDIX B. BATCH EMISSIONS CALCULATIONS.....71

TABLES

Number		Page
A-1	SOCMI Summary	29
A-2	Generally Batch Operated Facilities in SOCMI	42
A-3	Generally Continuously Operated Facilities in SOCMI	46
A-4	SOCMI Processes Operated Batchwise or Continuously	54
A-5	SOCMI Processes with Both Batch and Continuous Operations	55
A-6	SOCMI Agitator Usage Summary	56
A-7	Potential Sources of VOC Contaminated Process Water in SOCMI	65

FIGURES

1. Batch Vessel Filling—VOC Emissions for Model Compounds.....16
2. Batch System Heatup—VOC Emissions at Venting Under Constant Temperature and Pressure.....18
3. Batch System Heatup—VOC Emissions at Venting Under Increasing Temperature and Constant Pressure.....19
4. VOC Emissions from Batch System Pressure Letdown.....21
5. Losses from Vessel Wetted Surfaces.....23

PART A

SOCMI BATCH OPERATIONS/FUGITIVE SOURCES SURVEY

I. INTRODUCTION

This task was initiated to develop a data base for previously unquantified miscellaneous sources of fugitive volatile organic compound (VOC) emissions in the synthetic organic chemical manufacturing industry (SOCMI). One fugitive emissions source to be studied was the use of batch operations in SOCMI production. It is known that batch-operated facilities have unique miscellaneous fugitive VOC emission sources as compared to continuously operated facilities. Other fugitive emission sources of interest in this study are agitator seals and cooling towers that recirculate process water contaminated with VOC. Cooling towers that recirculate VOC-contaminated process water resulting from leaks in heat exchangers and/or condensers are not included in this study.

Part A of this report presents the results of an available-literature search for information on manufacturing processes currently used in SOCMI to produce 378 chemicals. The objectives of the data gathering were to determine the number of individual manufacturing processes generally operated batchwise and the number operated continuously and to estimate the number of agitator seals and cooling towers employing process water in SOCMI. Part B of this report presents a qualitative assessment of miscellaneous VOC emissions from batch-operated facilities and the appropriate controls that can be used to eliminate or reduce such emissions. Estimates of capital and operating costs or cost effectiveness associated with these controls have not been presented.

II. METHODOLOGY

A. DATA COLLECTION

The initial phase of this project involved gathering as much information from the available literature concerning manufacture of the 378 designated chemicals as could be located within the time limitations of the task. The information sought included any data describing currently utilized manufacturing methods. Details about processes were considered especially critical in determining whether the processes are generally operated batchwise or continuously and whether agitation and/or process waters are involved in the process. In addition to these details about the processes, information was gathered concerning manufacturers, production sites, and capacity and production amounts when available. The sources of literature reviewed to gather this information were as follows:

1. Kirk-Othmer Encyclopedia of Chemical Technology, 2nd Edition, Volumes 1—22, Wiley-Interscience Publications, New York, 1963.
2. Kirk-Othmer Encyclopedia of Chemical Technology, 3rd Edition, Volumes 1—8, Wiley-Interscience Publications, New York, 1978.
3. Chemical Economics Handbook, Chemical Information Services, SRI International, Menlo Park, Ca.
4. R. N. Shreve and J. B. Brink, Jr., Chemical Process Industries, 4th Edition, McGraw-Hill Book Company, 1977.
5. Directory of Chemical Producers 1979, United States of America, SRI International, Menlo Park, Ca. (Nov. 1979).
6. "Industrial Process Profiles for Environmental Use: Chapter 6: The Industrial Organic Chemicals Industry." EPA-600/2-77-023f, Industrial Environmental Research Laboratory. Office of Research and Development, U. S. EPA, Cincinnati, Ohio 45268 (February 1977).
7. F. A. Lowenheim and M. K. Moran, Faith, Keyes, and Clark's Industrial Chemicals, 4th Edition, Wiley-Interscience Publications, New York, 1975.

8. Private Reports by the Process Economics Program, Sanford Research Institute, Menlo Park, CA.
9. Chemical Products Synopsis, a Reporting Service of Mannsville Chemical Products, Mansville, NY.
10. Process Evaluation and Research Planning Service, Quarterly Reports, Chem Systems, Inc., New York, NY.
11. Organic Chemical Producers Data Base (OCPDB) Program, USEPA Cincinnati, OH, Updated Nov. 28, 1979.
12. G. G. Hawley, The Condensed Chemical Dictionary, Eight Edition, Van Nostrand Reinhold Company, New York, 1971.

Data were also gathered from available air emissions inventory questionnaires submitted by manufacturers to the air pollution control organizations in the states of Texas, Louisiana, and New Jersey. The reports prepared by IT Enviroscience, which describe emissions control options for SOCMI under EPA Contract No. 68-02-2577 for the Emission Standards and Engineering Division Office of Air Quality Planning and Standards in Research Triangle Park, North Carolina, also were utilized.

A literature search was also conducted on the Lockheed Dialog Program from IT Enviroscience's computer terminal to obtain supplemental data on 110 chemicals for which limited data had been obtained from other reference sources. The files selected for search included:

File No. 3 - 1972—1976 - Chemical Abstracts,
File No. 16 - Predicasts Market Abstracts,
File No. 19 - Chemical Industry Notes.

Relatively little useful information was obtained from the computer files. It was found that in most cases specific data have not yet been published on equipment usage and the type of operation.

In addition, a trip was made to Dow Chemical's Corporate Business Information Center in Midland, Michagan, to obtain supplemental

information on selected chemicals. Additional information that could be used was obtained on approximately 40 chemicals.

B. DATA EVALUATION

After the available data were gathered for each chemical the process of evaluating the data began. The first problem encountered involved conflicting information. For example, it was common to find variances in information about processes currently being used by industry in the manufacture of a specific chemical. It was also common to find variances in other reported information, such as capacity and production figures. The data evaluators relied on the more recent literature source to resolve such conflicts. When publication dates were similar the evaluators relied on the source which appeared most complete.

Another significant problem was the lack of published information. The following list is of unavailable data and of the methods used by the evaluators to provide the necessary information when an alternate method was available.

1. Capacity and/or Production Amounts Unavailable

No method for providing these data was available in many cases. When end use was as an intermediate for production of other products and the production figures were available for the end products, the production could be estimated. Production amounts were usually judged to be relatively small if no inforamtion was located.

2. Process or Processes Currently Utilized by Industry Not Specified

Information describing the production of similar chemicals was used to resolve this data gap when possible.

3. Batch or Continuous Operation Not Specified

Sites with relatively small capacities were judged to be batch operated unless the process would not lend itself to batch operation (e.g., a process with gaseous-phase reaction).

4. Unit Operations or Unit Processes Not Specified

Information was gathered from similar processes used in manufacturing similar chemicals. If this comparison was not possible, engineering judgement was used based on properties of the chemicals involved and likely purification and recovery techniques.

5. Use of Agitation Unspecified

Engineering judgement was used to provide the data and was based on types of unit processes and unit operations as well as properties of the chemicals involved.

6. Number of Agitated Steps Not Specified

It was normally estimated that at least two agitators would be needed for most agitated unit processes and/or unit operations.

7. Process Water Usage Unspecified

Information was gathered from similar processes used in manufacturing similar chemicals. No judgement could be made as to the presence or absence of process waters when this comparative information was lacking except in cases where water contact with the product would be deleterious (e.g., the chemical would decompose in the presence of water).

8. No Information About Possible Use of Cooling Towers Using Process Water

Usually no resolution method was available. In some isolated cases information from similar processes manufacturing similar chemicals could be used.

Following the evaluation of the raw data a computer program was developed to expedite data presentation and potential revisions. Information input to the program included the organic chemical producer's data base (OCPDB) number assigned to each chemical, identification of the production method as generally batch or continuously operated or as outside the scope of work, the chemical name, a brief

process description, production and capacity figures, unit operations (primarily physical operations involved with purifying and isolating products from reaction steps) for all chemicals if known, unit processes (reaction steps) for all chemicals if known, agitator usage data, and process water usage data. Also, data quality designations were input to identify the degree of certainty concerning whether the processes were batch or continuously operated and the degree of certainty concerning agitator usage and process water usage data.

III. RESULTS

A. BATCH OPERATIONS SURVEY

The primary objective of the task was to identify batch-operated processes. The tabulated results are shown in Appendix A. Table A-1 lists the OCPDB numbers, chemical names, brief process descriptions, and designation of whether the process is estimated to be generally batch or continuous operated or not in SOCMI. For the 378 chemicals, Table 1 lists 516 processes of which 154 were estimated to be batch operated, 313 were estimated to be continuously operated, 6 were identified as combination batch and continuously operated, and 43 were identified as not being in SOCMI because the process either is not currently used or does not meet the definition of SOCMI. It should be noted that there are 10 processes listed twice——once as batch operated and once as continuously operated because the literature indicate the two different production methods are currently used by industry at different production sites.

Table A-2 presents data for the generally batch-operated processes. The data include designations of quality (1 indicates high certainty the processes are batch operated and 2 indicates judgement was used to make the determination), major unit processes, unit operations, number of production sites, and production and capacity data. A zero designation under any heading in the table indicates no input was made in the computer program.

Table A-3 lists those processes that are generally continuously operated in SOCMI. The data presented is identical to that presented in Table A-2.

Table A-4 presents information about the 10 processes which the literature indicates are currently operated batchwise and continuously at different production sites. Table A-5 lists information on the 6 processes which are estimated to include both continuous and batch operations (generally the unit processes are continuously operated, but some unit operations are batch operated).

B. EQUIPMENT USAGE

Table A-6 presents data for processes which were estimated to utilize agitation. Included are a data quality designation (1 indicates high certainty, 2 indicates judgement was used, and 3 indicates unknown); an indication of whether agitation is used in the unit processes and unit operations, if known; number of production sites; estimates of the number of agitators; and production and capacity information when available. Information generated from the data in Table A-6 indicates an average of 3 agitators per batch-operated production site and 2 agitators per continuously operated production site. From these approximations, along with the determination from the data base that there are 390 batch-operated production sites and 955 continuously operated production sites, it was estimated there are 3080 agitators currently in use in SOCMI.

Table A-7 presents identified potential sources of VOC-contaminated process water in SOCMI and disposal routes where known. The data quality designations for this table are identical to those used in Table A-6. Again, a zero entry indicates no data were input to the computer program.

Insufficient usable data were generated during this task to estimate the number of cooling towers incorporating the recirculation of VOC-contaminated process water. Therefore, other sources of information had to be used to make this estimate. First, it had been previously estimated that there is one cooling tower per production site.[1] Second, the results of this task indicate there are 1345 SOCMI production sites. Finally, reports prepared by IT Enviroscience describing emissions control options for SOCMI under EPA Contract No. 68-02-2577 for the Emission Standards and Engineering Division Office of Air Quality Planning and Standards in Research

[1]D. G. Erikson, IT Enviroscience, Emissions Control Options for the Synthetic Organic Chemical Manufacturing Industry - Fugitive Emissions Report (on file at EPA, ESED, Research Triangle Park, NC, March 1981).

Triangle Park, North Carolina, indicate only 5% of the process cooling towers recirculate VOC-contaminated process waters. These separate sources of data were used to approximate that there are 70 cooling towers incorporating recirculation of VOC-contaminated process water which could be a source of fugitive emissions. These potential sources of emissions can be significantly controlled, i.e., eliminated in many cases by a variety of control techniques. They include: replacement of existing contact condensers with air- or water-cooled surface condensers, use of vacuum stripping to remove VOC from the process water before recycle to the cooling tower, and the use of an oil quench instead of a water quench with subsequent recycle of the oil either to a control device or back to the process.

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IV. SUMMARY

A literature search of data for details related to production methods for SOCMI chemicals indicates there are a total of 473 processes currently in use. An additional total of 43 processes were identified either as not currently in use or as not meeting the definition of SOCMI.

The data further indicate there are 313 continuously operated processes and 154 batch-operated processes. Ten processes from each designation were identified as being identical except that they are batch operated and continuously operated at different production sites. In addition, six processes were identified as having portions which are continuously operated and portions which are batch operated.

Estimates of equipment usage indicate there are about 3080 agitators used in SOCMI. Also, it was roughly estimated that there are about 70 cooling towers in SOCMI that incorporate recirculation of VOC-contaminated process water.

It should be noted that a wide disparity exists in quality of the data involved in this task. The data used to identify whether a specific process is generally batch operated or continuously operated were of better quality than data related to the use of agitation. Conversely, the data related to the use of agitation were of much better quality than data concerning the use of process water and the potential for existing cooling towers to use process water for recirculation. Validation of the data presented may be possible only through a detailed survey of SOCMI producers.

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V. RECOMMENDATIONS

It is recommended that the results of this task be used only as a data base for determining whether batch production methods, agitator seals, and cooling towers should be evaluated in more detail.

PART B

MISCELLANEOUS SOURCES OF FUGITIVE VOC EMISSIONS FROM BATCH OPERATIONS IN SOCMI

I. INTRODUCTION

Chemical processing in the organic chemical industry basically is of two types, continuous and batch. The bulk of organic chemicals are manufactured by continuous processing, which is usually more desirable than batch processing, especially for large-scale production and for processes involving the vapor phase. However, batch processing is important because some chemicals cannot be processed by any other means.

Chemical batch processing usually involves the manufacture of chemicals by unit processes (reactions) and unit operations sequenced so that the process materials will be successively handled in discrete quantities in each production step. Some generalizations can be made as to the selection of batch or continuous processing for organic chemicals manufactured but each production facility is an individual design decision. There are facilities in which part of the processing is batch and part continuous. Batch processing may be selected when (1) the reaction kinetics are slow; (2) a complex cycle of conditions such as temperature, pressure, and pH must be followed; (3) there is a sequence of several reactions that can be performed in one vessel, and the production volume is small; (4) the facility will produce multiple similar products on a campaign basis; and (5) the facility is the initial production plant for a new product.

II. BATCH EMISSION SOURCES

Several potential sources of VOC (volatile organic compounds) emissions are characteristic of batch-operated unit processes and unit operations; for example, vapor displacements related to moving fluids into and between equipment; temperature changes such as those that occur during system heatup; pressure changes such as those from purging and venting; inert-gas blankets used for reactive or safety reasons; equipment opened for maintenance, washing, cleaning or inspection; and samples taken for testing of the vessel contents.

A. DISPLACEMENT EMISSIONS FROM FLUID MOVEMENT

These displacement emissions are analogous to the filling losses that occur when volatile materials are loaded into storage tanks or cargo carriers and a net amount of gas is displaced to the atmosphere. For a batch vessel that is being filled and vented to the atmosphere, the composition and quantity of the gas displaced by the material being added will depend on the system conditions. The important variables are the system temperature and pressure, the vapor pressure and molecular weight of the materials being handled, the system's history that can determine the approach to saturation equilibrium, and the quantity of noncondensable gas in the system.

Figure 1 is a plot of vessel filling losses based on selected model compounds and on the assumptions that the volume of gas displaced is equal to the volume of liquid added and that the vessel is vented directly to the atmosphere.

B. DISPLACEMENT EMISSIONS FROM TEMPERATURE CHANGES

These displacement emissions are analogous to the diurnal breathing losses from storage tanks that occur when the tank vapor head space is heated and cooled on a daily cycle. For a batch system that is subjected to a heating cycle and in which noncondensable gases are present at the start of heating, the gases must be vented or the system pressure must be allowed to increase proportionately. When

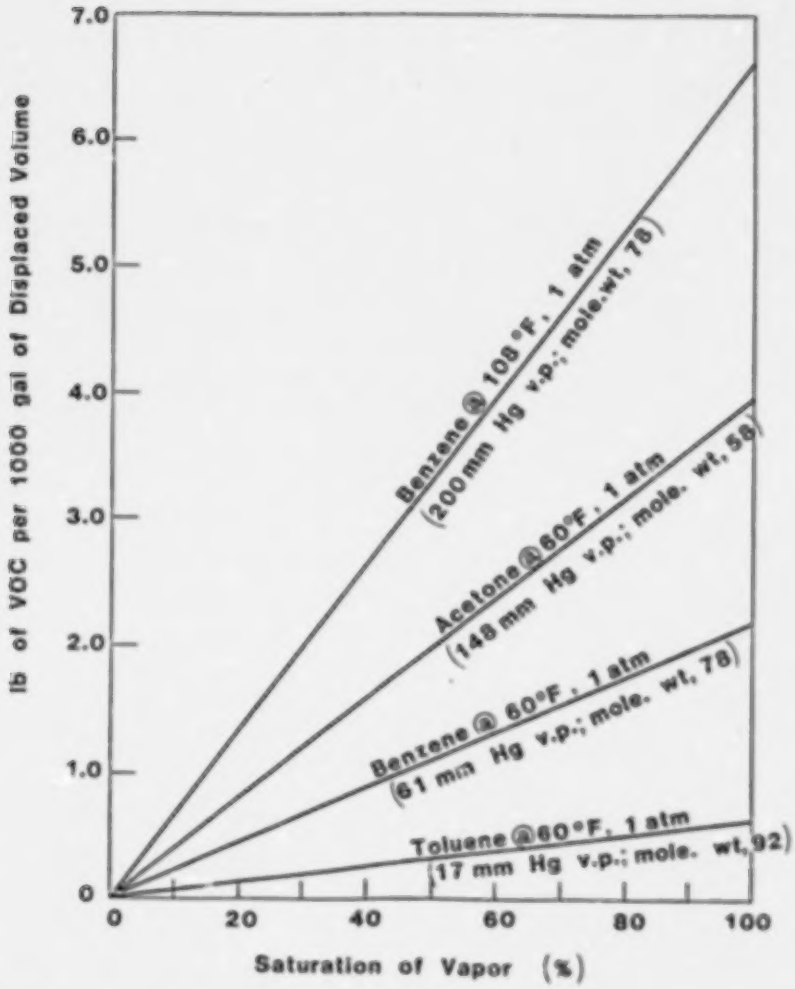

Fig. 1. Batch Vessel Filling—VOC Emissions for Model Compounds

the noncondensable gases are vented, they can contain VOC, the quantity of which will depend on the system conditions at the point of venting. The important variables are the temperature and pressure at which venting occurs; the vapor pressure and molecular weight of the materials being handled; the system cycle history, which can determine the approach to saturation of the vented material; the amount of noncondensable gases in the system; and the amount that needs to be vented. An example is a batch distillation system that is filled with noncondensable gases (air or an inert gas) before a new batch is loaded.

All the noncondensable gases present must be vented for proper operation of the column and the condenser. Venting usually is from the exit side of the condenser and the noncondensable gases are usually displaced from the system by the vaporization of the material to be distilled. The pressure and temperature of venting are controllable variables within the limits of the system design and operating conditions. For instance, noncondensable gases coming from the still pot and passing through the column and condenser would have a higher probability of being saturated with VOC on venting than those arising in the upper part of the distillation system.

Figure 2 is a plot of system heatup losses based on acetone as a model compound and on the assumptions of venting conditions of constant temperature and pressure and varying degrees of saturation as might occur on startup of a distillation system or a reactor venting through a condenser. Figure 3 is also a plot of system heatup losses, based on the assumptions of increasing temperature of venting at constant pressure and 100% saturation as might occur in venting directly from a reactor on heatup.

C. DISPLACEMENT EMISSIONS FROM PRESSURE LETDOWN

With a batch system that is subjected to a cycle of pressuring with noncondensable gases followed by venting to depressurize, the vented gas can contain VOC. One example is a system vacuum being broken

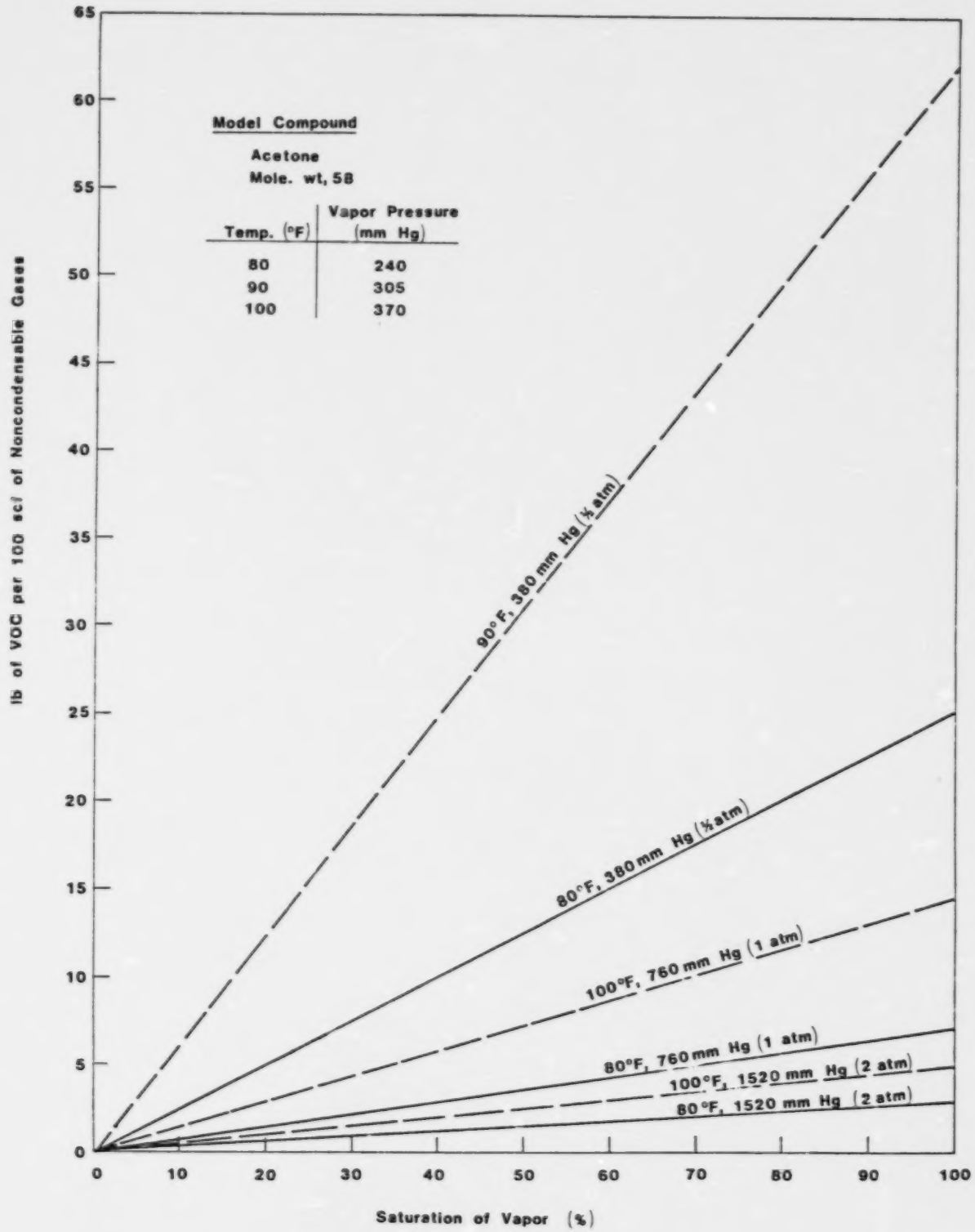

Fig. 2. Batch System Heatup—VOC Emissions at Venting Under Constant Temperature and Pressure

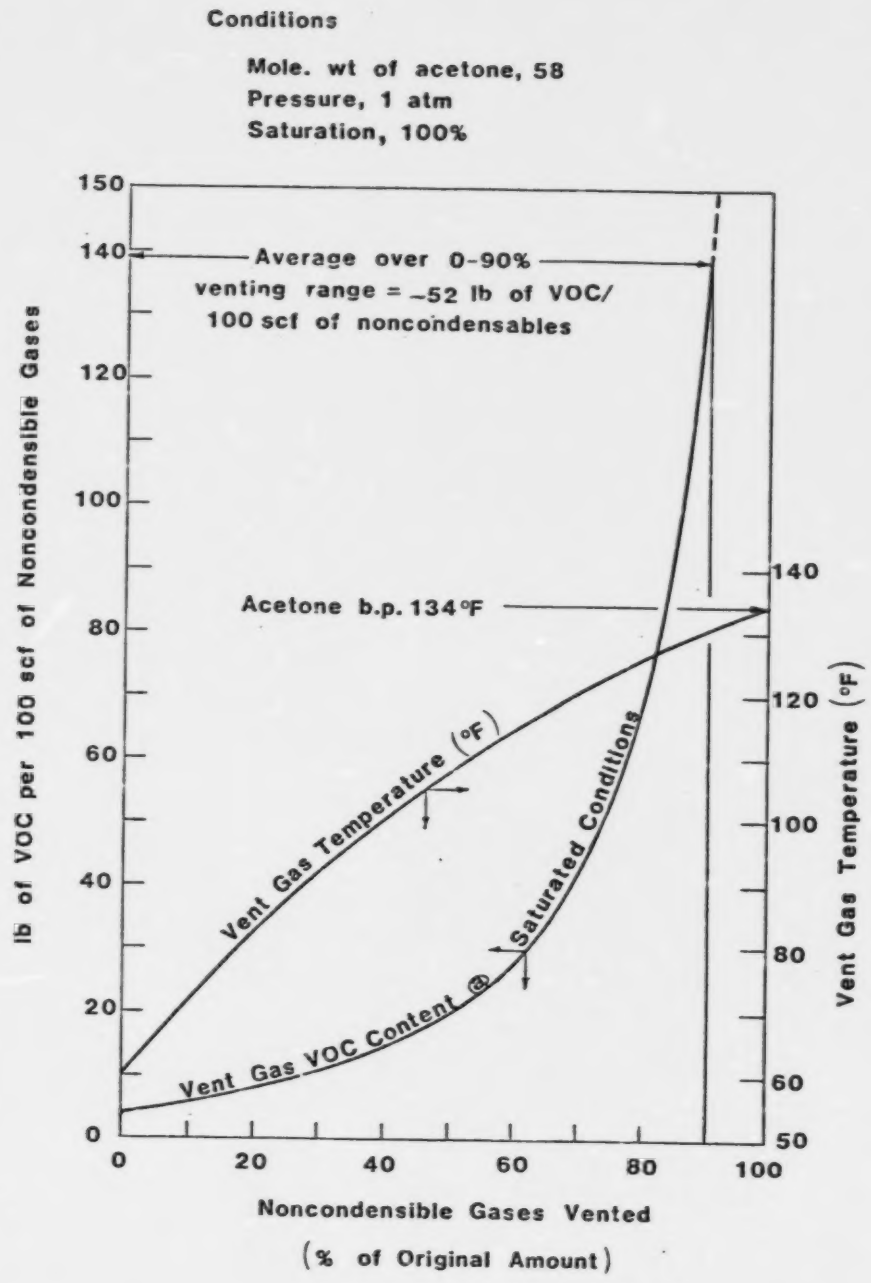

Fig. 3. Batch System Heatup—VOC Emissions at Venting Under Increasing Temperature and Constant Pressure

with an inert gas some time during a batch cycle followed by a subsequent vacuum evacuation such as may occur in a vacuum batch dryer. Another example is the release of a residual gas reactant under pressure at the end of a reaction cycle such as in a hydrogenation reaction. The VOC emissions will depend on the system conditions at the point of venting. The important variables are the temperature and pressure at which venting occurs, the vapor pressure and molecular weight of the materials in contact with the noncondensable gases, and the system cycle history that can determine the approach to saturation and the amount of noncondensable gases to be vented.

Figure 4 is a plot of system pressure letdown losses based on benzene and toluene as model compounds and on the assumption that the venting conditions are constant temperature, 100% saturation, and the pressure decreasing in one case from 10 atm to 1 atm and in the other from atmospheric pressure to a vacuum.

D. EMISSIONS FROM INERT-GAS BLANKETING

Inert gases are used at times in batch systems as nonreactive blankets over in-process materials, which can alleviate such potential problems as decomposition or degradation of in-process materials or fire and explosion hazards. When inert gases are used in a batch system, they can participate in the displacement-temperature change and the pressure mechanisms discussed previously. They can also be an emission potential if a net flow of inert gas is used to maintain the blanket. The important variables are the flow of gas, the temperature and pressure at which venting occurs, the vapor pressure and molecular weight of the material being contacted, and the degree of contact with the VOC. The inert-gas-blanketing emissions would be similar to the examples given in Fig. 2, where venting is shown at constant temperature and pressure and at varying degrees of saturation.

E. EMISSIONS FROM EQUIPMENT OPENINGS

In batch systems the occasions for opening reactors and other process equipment to the atmosphere are much more prevalent than in continuous

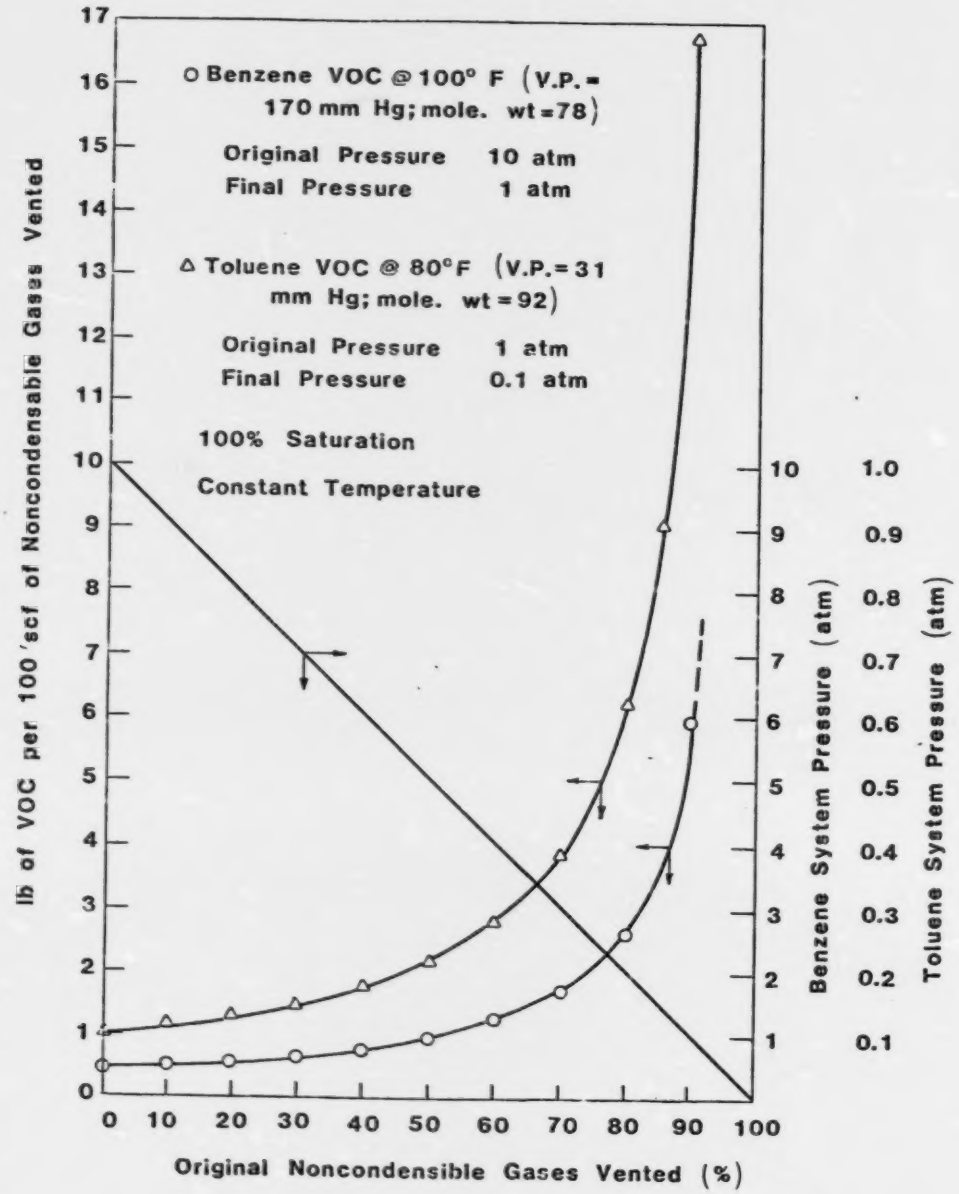
○ Benzene VOC @ 100° F (V.P. = 170 mm Hg; mole. wt = 78)
Original Pressure 10 atm
Final Pressure 1 atm
△ Toluene VOC @ 80°F (V.P. = 31 mm Hg; mole. wt = 92)
Original Pressure 1 atm
Final Pressure 0.1 atm
100% Saturation
Constant Temperature
lb of VOC per 100 scf of Noncondensable Gases Vented
Benzene System Pressure (atm)
Toluene System Pressure (atm)
Original Noncondensible Gases Vented (%)
0 10 20 30 40 50 60 70 80 90 100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
1 2 3 4 5 6 7 8 9 10
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

Fig. 4. VOC Emissions from Batch System Pressure Letdown

systems. Some of the various reasons for opening the equipment are to add reactant or other ingredients, to take a sample, to make physical inspections for cleanliness and material level, and to clean the equipment between batches or production campaigns. Normal access is usually through such openings as manholes and sampling or loading ports. Usually the operators or other personnel are involved, and frequently localized ventilation or purging is used for their safety. It is not possible to categorize all the important system variables that affect VOC emissions for these operations. Obviously important are the system conditions of material vapor pressures and temperature and the degree of ventilation or purging. Also important, however, are, for example, the procedures for sampling and the quantity of material left behind in the vessel as a heel.

An example of only one type of these potential emissions is analogous to the example of wetted wall emissions from floating-roof tanks. After a vessel is filled and emptied, residual VOC can wet the walls and could, when the vessel is opened, be emitted as an emission.

Figure 5 shows the amount of material clinging to the wetted surfaces of vessels of various sizes based on the clinging factor measured by Chicago Bridge and Iron Co.[1] on a steel plate.

[1]Chicago Bridge & Iron Co., SOHIO/CBI Floating Roof Emission Test Procedures, Supplemental Report, Feb. 15, 1977, p. 4-2.

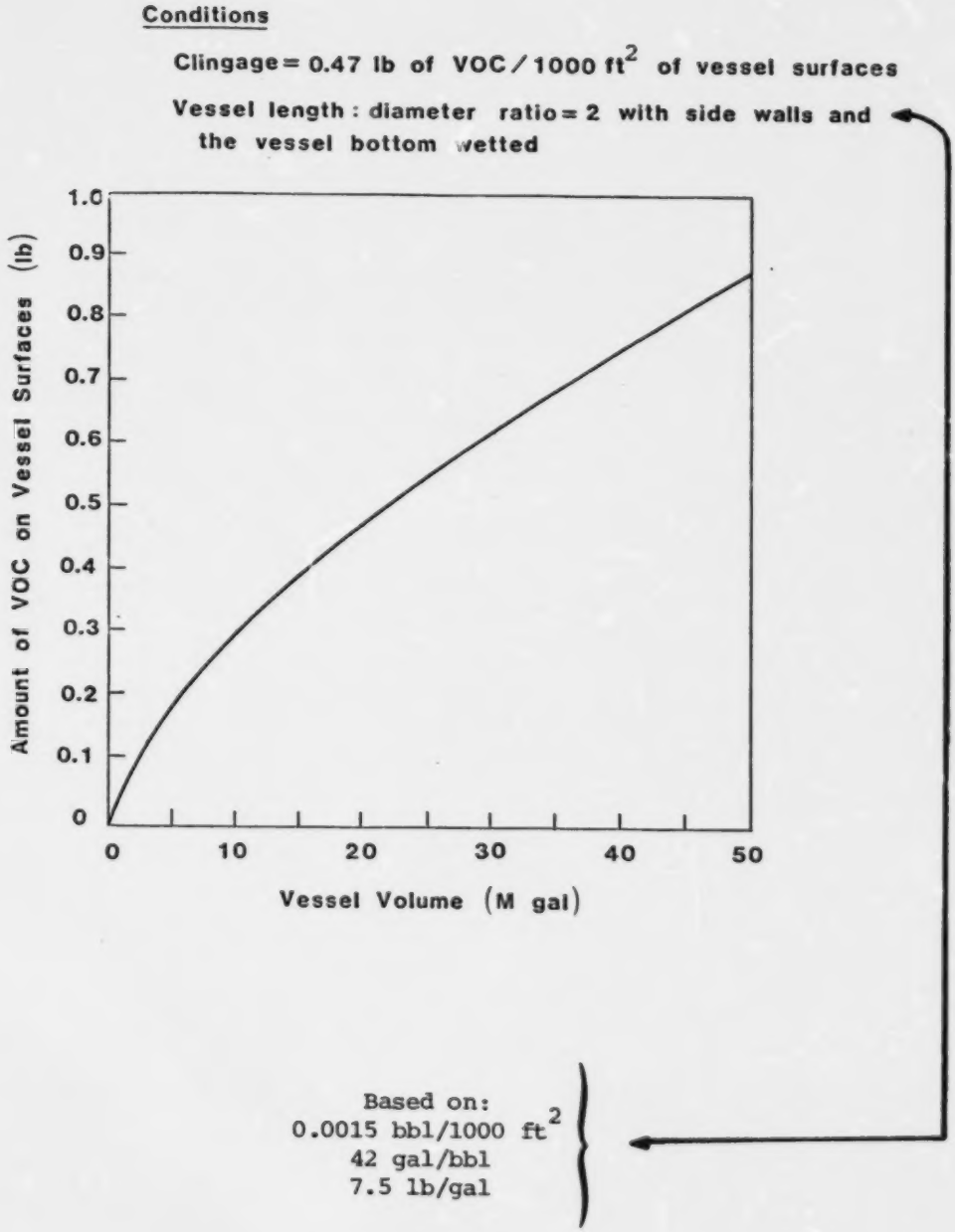

Fig. 5. Losses from Vessel Wetted Surfaces

III. CONTROL TECHNOLOGY

Control technology for emission sources that are characteristic to batch-operated processes is discussed only in generalities. A common property of potential batch emissions is the discharge of a noncondensable gas that has been in contact with VOC. Control technology can be divided into two areas, add-on controls and operating practices.

A. ADD-ON CONTROLS

The following types of major add-on controls may have applications for batch-operated systems:

1. Oxidation
   a. Thermal
   b. Catalytic
   c. Flares
2. Carbon adsorption
3. Absorption
4. Condensation

A typical batch-process-emission characteristic that has a significant negative impact on the use of add-on controls is the inherent transitory nature of the emission. This often requires that the add-on device be designed to handle large peak flows relative to the process size; it also may have significant periods of inactivity. For batch process emissions in which the noncondensable gas is air or contains oxygen, the designer of the add-on device must take into account the safety problem of explosive limits.

1. Oxidation

Thermal oxidation would probably have application only in special cases because it does not adapt well to the varying emission rate characteristics of batch processing. Catalytic oxidation has the limitation that the VOC concentration in the feed not be sufficient

to deactivate the catalyst by overheating, which restricts its application even more than thermal oxidation. Flaring, both elevated flares and enclosed ground flares, has the capability for handling widely intermittent and peak emission flows. The emission must have sufficient fuel value, generally >115 Btu/ft^3 for elevated flares and >65 Btu/ft^3 for ground flares, to sustain a flame. If it does not, an endothermic flare, in which fuel is added, can be used.

2. Carbon Adsorption

Carbon adsorption can have the capability of handling varying and cyclic emissions. The VOC concentration must not exceed those limits beyond which the heat of adsorption would become a heat build-up problem. The VOC species must have a workable adsorption/desorption cycle for the activated carbon that is used.

3. Absorption

Absorption applications would probably be limited to two special cases: when the absorbent is a material used in the process, such as using the feed for the next batch reaction or processing step to scrub a vent emission, and when the VOC is soluble in water and water is used as the absorbent. In the latter case the absorbed VOC could be a source of secondary emissions as a result of subsequent wastewater treatment.

4. Condensation

Control by condensation will have the potential for broader application to batch-type emissions than the other add-on controls, but its efficiency will be limited by the vapor pressures of the VOC materials being handled and by the condensation temperatures that can be used. An example would be the addition of a refrigerated tail condenser on the vent from a primary overhead condenser in the batch distillation system.

B. OPERATING PRACTICES

In connection with operating practices for reducing emissions from batch processes, an effort is made to reduce the amount of noncondensable gases that are involved in the operation and to lessen the contact of noncondensable gases with VOC. By reviewing in detail and changing the operating procedures that actually are being used, the emissions resulting from many batch processes can be reduced. It is impossible to describe all the potential reductions for a particular process. For instance, only a detailed understanding of the process can determine the minimum number of transfers that can be used, or the vessel openings required, or the minimum sampling required, and the like. Some general operating practices that can be effective are described below:

1. Vapor Balancing

Vapors displaced while one vessel is being filled can be returned by interconnected vapor lines to the charging vessel.

2. Bottom Loading

A vessel can be loaded through a bottom connection or through a dip-pipe from the top so that there will be less potential for the VOC to vaporize into the noncondensable gases that are being displaced and vented.

3. Vacuum Loading

The noncondensable gases in a vessel can be evacuated before the VOC is loaded into it, thus reducing the amount that will come in contact with VOC. The vessel must not contain an appreciable amount of VOC before it is evacuated, or else the VOC from the vacuum system discharge must be adequately treated.

4. Displacement with a Second Fluid

Displacement with a second fluid is a specialized practice used in vinyl chloride polymerization. The noncondensable gases are displaced

from a vessel by water, which is then displaced with vinyl chloride vapor followed by charging with vinyl chloride.

5. Closed Cleaning

The objective in closed cleaning is either to remove residual VOC from a vessel without it being opened or to remove the VOC before the vessel is opened. Practices that can be used are washing with non-VOC fluid or, as in the case of vinyl chloride,[2] removing the residual by use of vacuum vaporization followed by condensation.

6. Closed Sampling

The various techniques of closed sampling, such as a closed sampling piping loop or other permanent sampling facilities, can reduce the number of times that the vessel must be opened or can eliminate other sources of potential VOC sampling emissions.

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[2]Standard Support and Environmental Impact Statement: Emission Standard for Vinyl Chloride, EPA-450/2-75-009 (October 1975).

APPENDIX A

RESULT TABULATIONS

Table A-1. SOCMI Summary

OCPDB No.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
20	ACETAL	ACETALDEHYDE AND ETHANOL	X		
30	ACETALDEHYDE	ETHYLENE OXIDATION		X	
		ETHANOL OXIDATION		X	
		CO-PRODUCT OF OCPDB NO. 140		X	
40	ACETALDOL	ACETALDEHYDE SELF CONDENSATION	X		
50	ACETAMIDE	ETHYL ACETATE AMMONOLYSIS	X		
65	ACETANILIDE	ANILINE AND ACETIC ACID	X		
		ANILINE AND ACETYLCHLORIDE	X		
70	ACETIC ACID	METHANOL CARBONYLATION		X	
		PERACETIC ACID AND ALLYL CHLORIDE		X	
		ACETALDEHYDE OXIDATION		X	
		N-BUTANE OXIDATION		X	
		ETHANOL FERMENTATION			X
		BY-PRODUCT OF OCPDB NO. 2090 PROCESS 2		X	
80	ACETIC ANHYDRIDE	PAPER MILL WASTE STREAM			X
90	ACETONE	ACETIC ACID PYROLYSIS		X	
		CO-PRODUCT OF OCPDB NO. 2910 PROCESS 1		X	
		ISOPROPANOL DEHYDRATION		X	
		ISOPROPANOL OXIDATION		X	
		BY-PRODUCT OF OCPDB NO. 2740	X		
		BY-PRODUCT OF OCPDB NO. 2200 PROCESS 1	X		
100	ACETONE CYANOHYDRIN	BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2		X	
110	ACETONITRILE	ACETONE AND HCN		X	
		BY-PRODUCT OF OCPDB NO. 170		X	
120	ACETOPHENONE	UNSPECIFIED	X		
		ETHYL BENZENE OXIDATION	X		
125	ACETYL CHLORIDE	CO-PRODUCT OF OCPDB NO. 2910 PROCESS 1		X	
130	ACETYLENE	ACETIC ACID CHLORINATION	X		
		METHANE PYROLYSIS		X	
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)		X	
		CALCIUM CARBIDE			X
140	ACROLEIN	PROPYLENE OXIDATION		X	
150	ACRYLAMIDE	ACRYLONITRILE AND SULFURIC ACID	X		
		CATALYTIC HYDRATION OF VCN		X	
160	ACRYLIC ACID AND ESTERS	MODIFIED REPPE		X	
		PROPYLENE OXIDATION		X	
170	ACRYLONITRILE	PROPYLENE AMMOXIDATION		X	
180	ADIPIC ACID	CYCLOHEXANOL OXIDATION	X	X	
185	ADIPONITRILE	ACRYLONITRILE ELECTROHYDRODIMERIZATION		X	

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
185	ADIPONITRILE	BUTADIENE CHLORINATION		X	
190	ALKYL NAPTHALENES	CYCLOHEXANE		X	
200	ALLYL ALCOHOL	NO UNIT PROCESS			X
		PROPYLENE OXIDE ISOMERIZATION		X	
210	ALLYL CHLORIDE	ALLYLCHLORIDE HYDROLYSIS		X	
220	AMINOBENZOIC ACID	PROPYLENE CHLORINATION		X	
230	AMINOETHYLETHANOLAMINE	NITROBENZOIC ACIDS	X		
235	P-AMINOPHENOL	ETHYLENE OXIDE AND EDA		X	
		NITROBENZENE/SULFURIC ACID	X		
240	AMYL ACETATES	NITROPHENOL REDUCTION	X		
250	AMYL ALCOHOLS	AMYL ALCOHOL ESTERIFICATION		X	
		OXO PROCESS		X	
260	AMYL AMINE	AMYLCHLORIDE HYDROLYSIS		X	
270	AMYL CHLORIDE	AMYL ALCOHOL AMMONOLYSIS		X	
280	AMYL MERCAPTAN	PENTANE CHLORINATION		X	
290	AMYL PHENOL	AMYL CHLORIDE AND HYDROSULFIDE	X		
300	ANILINE	PHENOL ALKYLATION	X		
310	ANILINE HYDROCHLORIDE	NITROBENZENE HYDROGENATION		X	
320	ANSIDINE (S)	ANILINE AND HCL	X		
330	ANISOLE	NITROANISOLE REDUCTION	X		
340	ANTHRANILIC ACID	PHENATE SALT ALKYLATION	X		
350	ANTHRAQUINONE	PHTHALIMIDE	X		
360	BENZALDEHYDE	ANTHRACENE OXIDATION		X	
		BENZALCHLORIDE HYDROLYSIS	X		
370	BENZAMIDE	TOLUENE OXIDATION		X	
380	BENZENE	BENZOYLCHLORIDE AND NH3	X		
		PETROLUEM REFORMING			X
		COAL DERIVATIVE			X
		TOLUENE HYDRODEALKYLATION		X	
		TOLUENE DISPROPORTIONATION		X	
390	BENZENE DISULFONIC ACIDS	CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)		X	
400	BENZENE SULFONIC ACID	BENZENE SULFONIC ACID	X		
		BENZENE SULFONATION		X	
410	BENZIL	BENZENE SULFONATION	X		
420	BENZILIC ACID	BENZOIN OXIDATION	X		
430	BENZOIC ACID	BENZIL REARRANGEMENT	X		
440	BENZOIN	TOLUENE OXIDATION		X	
450	BENZONITRILE	BENZALDEHYDE	X		
		TOLUENE AMMOXIDATION		X	

(CONTINUED)

Table A-1. (Continued)

CPDD NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
440	BENZOPHENONE	BENZENE AND CCL4	X		
460	BENZOTRICHLORIDE	BY-PRODUCT OF OCPDB NO. 530 PROCESS 1	X		
		BY-PRODUCT OF OCPDB NO. 530 PROCESS 1		X	
490	BENZOYL CHLORIDE	BENZOTRICHLORIDE	X		
500	BENZYL ALCOHOL	BENZYL CHLORIDE HYDROLYSIS	X		
510	BENZYL AMINE	BENZYL CHLORIDE AMMONOLYSIS	X		
520	BENZYL BENZOATE	BENZALDEHYDE	X		
		BENZOIC ACID AND BENZYL ALCOHOL	X		
530	BENZYL CHLORIDE	TOLUENE CHLORINATION		X	
		TOLUENE CHLORINATION	X		
540	BENZYL DICHLORIDE	CO-PRODUCT OF OCPDB NO. 530 PROCESS 1		X	
		CO-PRODUCT OF OCPDB NO. 530 PROCESS 2	X		
550	BIPHENYL	CO-PRODUCT OF OCPDB NO. 380 PROCESS 3		X	
		BENZENE DEHYDROGENATION		X	
560	BISPHENOL A	PHENOL/ACETONE		X	
570	BROMOBENZENE	BENZENE BROMINATION	X		
580	BROMONAPTHALENE	NAPTHALENE BROMINATION	X		
590	BUTADIENE	N-BUTENE DEHYDROGENATION		X	
		N-BUTANE (HOUDRY)		X	
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)		X	
592	N-BUTENE	PETROLEUM REFINING			X
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)		X	
		ALPHA-OLEFINS		X	
600	N-BUTYL ACETATE	BUTANOL ESTERIFICATION	X		
630	N-BUTYL ACRYLATE	MODIFIED SOHIO		X	
		BUTANOL AND ACRYLIC ACID		X	
640	N-BUTYL ALCOHOL	OXO PROCESS		X	
		CROTONALDEHYDE HYDROGENATION		X	
650	S-BUTYL ALCOHOL	BUTENE HYDRATION		X	
660	T-BUTYL ALCOHOL	BY-PRODUCT OF OCPDB NO. 3126 PROCESS 2		X	
		ISOBUTYLENE		X	
670	N-BUTYLAMINE	BUTYRALDEHYDE		X	
680	S-BUTYLAMINE	BUTANOL AND AMMONIA		X	
690	T-BUTYLAMINE	ISOBUTYLENE AND HCN		X	
700	P-T-BUTYL BENZOIC ACID	TOLUENE/ISOBUTYLENE OXIDATION		X	
710	1,3-BUTYLENE GLYCOL	ACETALDOL HYDROGENATION		X	
750	N-BUTYRALDEHYDE	OXO PROCESS		X	
760	BUTYRIC ACID	CO-PRODUCT IF OCPDB NO. 70 PROCESS 4		X	
		N-BUTYRALDEHYDE OXIDATION		X	
770	BUTYRIC ANHYDRIDE	BUTYRIC ACID AND KETENE		X	

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
780	BUTYRONITRILE	PROPYL CHLORIDE AND HCN	X		
785	CAPROLACTAM	CYCLOHEXANONE	X	X	
790	CARBON DISULFIDE	METHANE AND SULFUR		X	
800	CARBON TETRABROMIDE	CCL4 AND HYDROGEN BROMIDE	X		
810	CARBON TETRACHLORIDE	CARBON DISULFIDE CHLORINATION		X	
		METHANE CHLORINATION		X	
		HYDROCARBON CHLORINOLYSIS		X	
820	CELLULOSE ACETATE	CELLULOSE ESTERIFICATION	X	X	
840	CHLOROCETIC ACID	ACETIC ACID CHLORINATION	X		
850	M-CHLOROANILINE	CHLORONITROBENZENE	X		
860	O-CHLOROANILINE	CHLOROACETANILIDE ACIDIFICATION	X		
870	P-CHLOROANILINE	CO-PRODUCT OF OCPDB NO. 860	X		
880	CHLOROBENZALDEHYDE	P-CHLORO TOLUENE	X		
890	CHLOROBENZENE	BENZENE CHLORINATION		X	
		BENZENE CHLORINATION	X		
900	CHLOROBENZOIC ACID	CHLOROTOLUENE CHLORINATION/HYDROLYSIS	X		
905	CHLOROBENZOTRICHLORIDE	NO U.S. PRODUCERS			X
910	CHLOROBENZOYL CHLORIDE	CHLOROBENZOIC ACID	X		
920	CHLORODIFLUOROETHANE	DIFLUROETHANE CHLORINATION		X	
921	CHLORODIFLUOROMETHANE	CHLOROFORM FLUORINATION		X	
930	CHLOROFORM	CO-PRODUCT OF OCPDB NO. 810 PROCESS 2		X	
		METHYLCHLORIDE CHLORINATION		X	
940	CHLORONAPTHALENE	NO U.S. PRODUCERS			X
950	O-CHLORONITROBENZENE	CHLOROBENZENE NITRATION		X	
951	P-CHLORONITROBENZENE	CO-PRODUCT OF OCPDB NO. 950		X	
960	CHLOROPHENOLS (O,M,P)	PHENOL CHLORINATION	X		
964	CHLOROPRENE	BUTADIENE CHLORINATION		X	
965	CHLOROSULFONIC ACID	NOT AN ORGANIC			X
970	M-CHLOROTOLUENE	NO U.S. PRODUCERS			X
980	O-CHLOROTOLUENE	TOLUENE CHLORINATION	X		
990	P-CHLOROTOLUENE	CO-PRODUCT OF OCPDB NO. 980	X		
992	CHLOROTRIFLUOROMETHANE	CHLORODIFLUOROMETHANE PYROLYSIS		X	
1000	M-CRESOL	PETROLEUM EXTRACTANT			X
		COAL TAR DISTILLATE			X
1010	O-CRESOL	COAL OR PETROLEUM DERIVATIVE			X
		PHENOL METHYLATION		X	
1020	P-CRESOL	TOLUENE SULFONATION		X	
1021	MIXED CRESOLS	PHENOL METHYLATION		X	
		PETROLEUM DERIVATIVES			X
1030	CRESYLIC ACID	COAL TAR DERIVATIVE			X
		PETROLEUM DERIVATIVE			X

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
1030	CRESYLIC ACID	CO-PRODUCT OF OCPDB NO. 1021 PROCESS 1		X	
1040	CROTONALDEHYDE	ACETALDEHYDE CONDENSATION		X	
1050	CROTONIC ACID	CROTONALDEHYDE OXIDATION		X	
1060	CUMENE	BENZENE ALKYLATION		X	
1070	CUMENE HYDROPEROXIDE	CUMENE OXIDATION		X	
1080	CYANOACETIC ACID	SODIUM CHLOROACETATE		X	
1090	CYANOGEN CHLORIDE	HCN CHLORINATION		X	
1100	CYANURIC ACID	UREA PYROLYSIS	X		
1110	CYANURIC CHLORIDE	CYANOGEN CHLORIDE		X	
1120	CYCLOHEXANE	BENZENE HYDROGENATION		X	
		PETROLEUM DERIVATIVE			X
1130	CYCLOHEXANOL	CYCLOHEXANE OXIDATION		X	
		PHENOL HYDROGENATION		X	
1140	CYCLOHEXANONE	CO-PRODUCT OF OCPDB NO. 1130 PROCESS 1		X	
		CO-PRODUCT OF OCPDB NO. 1130 PROCESS 2		X	
1150	CYCLOHEXENE	CYCLOHEXANOL DEHYDRATION		X	
1160	CYCLOHEXYLAMINE	ANILINE HYDROGENATION	X		
1170	CYCLOOCTADIENE	BUTADIENE DIMERAZATION		X	
1180	DECANOL	ALFOL		X	
		MODIFIED ZIEGLER		X	
		OXO PROCESS		X	
1190	DIACETONE ALCOHOL	ACETONE CONDENSATION		X	
1200	DIAMINOBENZOIC ACID	DINITROBENZOIC ACID	X		
1210	DICHLOROANILINE	DICHLORONITROBENZENE	X		
1215	M-DICHLOROBENZENE	DCB ISOMERIZATION	X		
1216	O-DICHLOROBENZENE	*CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	X	X	
1220	P-DICHLOROBENZENE	*CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	X	X	
1221	DICHLORODIFLUOROMETHANE	CCL4 HYDROFLUORINATION		X	
1240	DICHLOROETHYL ETHER	ETHYL ETHER CHLORINATION	X		
1244	DICHLOROETHANE (EDC)	ETHYLENE CHLORINATION		X	
1250	DICHLOROHYDRIN	CO-PRODUCT OF OCPDB NO. 2091		X	
1270	DICHLOROPROPENE	CO-PRODUCT OF OCPDB NO. 210		X	
1280	DICYCLOHEXYLAMINE	ANILINE HYDROGENATION		X	
1290	DIETHYLAMINE	CO-PRODUCT OF OCPDB NO. 1700		X	
1300	DIETHYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 1830		X	
1304	DIETHYLENE GLYCOL DIETHYL ETHER	NO U.S. PRODUCERS			X
1305	DIETHYLENE GLYCOL DIMETHYL ETHER	DEG METHYL ETHER AND METHYL CHLORIDE	X		
1310	DIETHYLENE GLYCOL MONOBUTYL ETHER	ETHYLENE OXIDE AND BUTANOL		X	
1320	DIETHYLENE GLYCOL MONOBUTYL ETHER ACETATE	DEG BUTYL ETHER ESTERIFICATION		X	
1330	DIETHYLENE GLYCOL MONOETHYL ETHER	ETHYLENE OXIDE AND ETHANOL		X	

*O, P - dichlorobenzenes are co-products of chlorobenzene which can be produced in either a batch or continuous process.

(continued)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
1340	DIETHYLENE GLYCOL ETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION		X	
1360	DIETHYLENE GLYCOL MONO METHYL ETHER	ETHYLENE OXIDE AND METHANOL		X	
1420	DIETHYL SULFATE	ETHYLENE AND SULFURIC ACID		X	
1430	DIFLUOROETHANE	ACETYLENE AND HYDROGEN FLUORIDE		X	
1440	DIISOBUTYLENE	ISOBUTYLENE		X	
		BUTYLENE EXTRACTION			X
1442	DIISODECYL PHTHALATE	PHTHALIC ANHYDRIDE AND ISODECANOL	X		
1444	DIISOCTYL PHTHALATE	PHTHALIC ANHYDRIDE AND ISOOCTANOL	X		
1450	DIKETENE	DIMERIZATION OF KETENE		X	
1460	DIMETHYLAMINE	CO-PRODUCT OF OCPDB NO. 2530		X	
1470	DIMETHYL ANILINE	ANILINE AND METHANOL	X		
1480	DIMETHYL ETHER	METHANOL AND SULFURIC ACID		X	
1490	DIMETHYL FORMAMIDE	DIMETHYAMINE AND CO		X	
		METHYL FORMATE AND DIMETHYLAMINE		X	
1495	DIMETHYL HYDRAZINE	DIMETHYLAMINE		X	
1500	DIMETHYL SULFATE	DIMETHYL ETHER AND SO3		X	
1510	DIMETHYL SULFIDE	METHANOL AND HYDROGEN SULFIDE		X	
		LIGNIN DEMETHYLATION	X		
1520	DIMETHYL SULFOXIDE	DIMETHYL SULFIDE OXIDATION		X	
1530	DIMETHYL TEREPHTHALATE	P-XYLENE OXIDAITON		X	
1540	3,5 DINITROBENZOIC ACID	BENZOIC ACID NITRATION	X		
1545	DINITROPHENOL	CO-PRODUCT OF OCPDB NO. 2792	X		
1550	DINITROTOLUENE	TOLUENE NITRATION		X	
1560	DIOXANE	ETHYLENE GLYCOL	X		
1570	DIOXOLANE	ETHYLENE GLYCOL		X	
1580	DIPHENYLAMINE	ANILINE CONDENSATION	X		
1590	DIPHENYL OXIDE	CHLOROBENZENE/PHENOL/NAOH CONDENSATION		X	
1600	DIPHENYL THIOUREA	ANILINE CONDENSATION	X		
1610	DIPROPYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 3111		X	
1620	DODECENE	PROPYLENE POLYMERIZATION		X	
1630	DODECYLANILINE	DODECYL ALCOHOL	X		
1640	DODECYLPHENOL	PHENOL ALKYLATION		X	
		PHENOL ALKYLATION	X		
1650	EPICHLOROHYDRIN	ALLYL CHLORIDE		X	
1660	ETHANOL	ETHYLENE HYDRATION		X	
		FERMENTATION			X
1661	ETHANOLAMINES	ETHYLENE OXIDE AMMONOLYSIS		X	
1670	ETHYL ACETATE	ACETALDHYDE		X	
		POLYVINYL ACETAL		X	
		CO-PRODUCT OF OCPDB NO. 70 PROCESS 4		X	

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
1680	ETHYL ACETOACETATE	DIKETENE AND ETHANOL		X	
1690	ETHYL ACRYLATE	MODIFIED REPP		X	
		ETHANOL AND ACRYLIC ACID		X	
1700	ETHYLAMINE	ETHANOL AMMONOLYSIS		X	
1710	ETHYLBENZENE	BENZENE ALKYLATION		X	
		XYLENES DISTILLATION			X
1720	ETHYL BROMIDE	ETHYLENE AND HYDROGEN BROMIDE		X	
1730	ETHYL CELLULOSE	CELLULOSE AND CAUSTIC	X		
1740	ETHYL CHLORIDE	ETHYLENE HYDROCHLORINATION		X	
1750	ETHYL CHLOROACETATE	CHLOROACETIC ACID ESTERIFICATION	X		
1760	ETHYL CYANOACETATE	CYANOACETIC ACID	X		
1770	ETHYLENE	REFINERY GASES		X	
		NATURAL GAS LIQUIDS		X	
		HEAVY LIQUIDS		X	
1780	ETHYLENE CARBONATE	ETHYLENE OXIDE AND CO2		X	
1790	ETHYLENE CHLOROHYDRIN	ETHYLENE AND HYPOCHLOROUS ACID		X	
1800	ETHYLENE DIAMINE	ETHYLENE DICHLORIDE AND NH3		X	
1810	ETHYLENE DIBROMIDE	ETHYLENE BROMINATION		X	
1830	ETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION		X	
1840	ETHYLENE GLYCOL DIACETATE	ETHYLENE GLYCOL ESTERIFICATION		X	
1870	ETHYLENE GLYCOL DIMETHYL ETHER	EGMME AND METHYL CHLORIDE	X		
1890	ETHYLENE GLYCOL MONOBUTYL ETHER	ETHYLENE OXIDE AND N-BUTANOL		X	
1900	ETHYLENE GLY. MONOBUTYL ETHER ACETATE	ESTERIFICATION WITH A.A.		X	
1910	ETHYLENE GLYCOL MONOETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890		X	
1920	ETHYLENE GLY. MONOETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION		X	
1930	ETHYLENE GLYCOL MONOMETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890		X	
1940	ETHYLENE GLY. MONOMETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION		X	
1960	ETHYLENE GLYCOL MONOPHENYL ETHER	ETHYLENE OXIDE AND PHENOL	X		
1970	ETHYLENE GLYCOL MONOPROPYL ETHER	ETHYLENE OXIDE AND PROPANOL		X	
1980	ETHYLENE OXIDE	ETHYLENE OXIDATION		X	
1990	ETHYL ETHER	ETHANOL DEHYDRATION		X	
		BY-PRODUCT OF OCPDB NO. 1660 PROCESS 1		X	
2000	2-ETHYLHEXANOL	OXO PROCESS		X	
2010	ETHYL ORTHOFORMATE	HCN + ETHANOL + HCL	X		
2020	ETHYL OXALATE	OXALIC ACID ESTERIFICATION	X		
2030	ETHYL SODIUM OXALACETATE	ETHYL ACETATE	X		
2040	FORMALDEHYDE	METHANOL OXIDATION		X	
2050	FORMAMIDE	AMMONOLYSIS METHYL FORMATE	X		
2060	FORMIC ACID	CO-PRODUCT OF OCPDB NO. 70 PROCESS 4		X	
2070	FUMARIC ACID	BY-PRODUCT OF OCPDB NO. 2440	X		

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
2070	FUMARIC ACID	MALEIC ACID ISOMERIZATION		X	
		MALEIC ANHYDRIDE		X	
		BY-PRODUCT OF OCPDB NO. 2960 (ALL PR.)		X	
2073	FURFURAL	ACID HYDROLYSIS	X	X	
2090	GLYCEROL	EPICHLOROHYDRIN		X	
		ALLYL ALCOHOL		X	
		GLYCIDOL		X	
2091	GLYCEROL DICHLOROHYDRIN	ALLYLCHLORIDE CHLOROHYDRINATION		X	
2100	GLYCEROL HYDROXYISOPROPYL ETHER	GLYCEROL REACTED WITH PROPYLENE OXIDE	X		
2110	GLYCINE	AMMONOLYSIS OF CHLOROACETIC ACID	X		
2120	GLYOXAL	OXIDATION OF ACETALDEHYDE		X	
2145	HEXACHLOROBENZENE	NO U.S. PRODUCERS			X
2150	HEXACHLOROETHANE	CHLORINATION OF PERCHLOROETHYLENE	X		
2160	HEXADECYL ALCOHOL	OXO PROCESS		X	
		REDUCTION OF ESTERS	X		
2165	HEXAMETHYLENEDIAMINE	HYDROGENATION OF ADIPONITRILE		X	
		AMMONOLYSIS OF 1-6-HEXANEDIOL		X	
2170	HEXAMETHYLENEGLYCOL	REDUCTION OF DIETHYLADIPATE		X	
2180	HEXAMETHYLENE TETRAMINE	AMMONOLYSIS OF FORMALDEHYDE		X	
2190	HYDROGEN CYANIDE	REACTION OF AMMONIA, AIR, AND METHANE		X	
		BY-PRODUCT OF OCPDB NO. 170		X	
2200	HYDROQUINONE	REDUCTION OF QUINONE	X		
		CLEAVAGE OF DHP		X	
2210	P-HYDROXYBENZOIC ACID	ACIDIFICATION OF THE ACID SALT	X		
2240	ISOAMYLENE	DEHYDRATION OF ISOAMYL ALCOHOL		X	
2250	ISOBUTANOL	OXO		X	
2260	ISOBUTYL ACETATE	ESTERIFICATION OF ACETIC ACID	X		
2261	ISOBUTYLENE	DEHYDRATION OF T-BUTANOL		X	
		DEHYDRATION OF T-BUTANOL FROM BYSTREAM		X	
2270	ISOBUTRALDEHYDE	OXO		X	
2280	ISOBUTYRIC ACID	AIR OXIDATION OF ISOBUTRALDEHYDE		X	
2300	ISODECANOL	OXO FROM NONENE		X	
2320	ISOOCTYL ALCOHOL	OXO FROM HEPTENE		X	
2321	ISOPENTANE	PETROLEUM DERIVATIVE			X
2330	ISOPHORONE	CONDENSATION OF ACETONE		X	
2340	ISOPHTALIC ACID	AIR OXIDATION OF M-XYLENE		X	
2350	ISOPRENE	DEHYDROGENATION OF ISOAMYLENE		X	
		PETROLEUM DERIVATIVE			X
2360	ISOPROPANOL	HYDROLYSIS OF PROPYL SULFATE		X	
		BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2		X	

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
2370	ISOPROPYL ACETATE	ISOPROPANOL ESTERIFICATION	X		
2380	ISOPROPYL ALCOHOL	AMMONOLYSIS OF ISOPROPYL ALCOHOL		X	
		AMMONOLYSIS OF KETENE		X	
2390	ISOPROPYL CHLORIDE	HYDROCHLORINATION OF ISOPROPYL ALCOHOL		X	
2400	ISOPROPYL PHENOL	FRIEDEL CRAFTS	X		
2410	KETENE	PYROLYSIS OF ACETIC ACID		X	
		UNSPECIFIED		X	
2414	LINEAR ALKYL SULFONATE	OLEUM SULFONATION OF LAB	X		
		SO3-AIR SULFONATION OF LAB		X	
		LIQUID SO3-SO2 SULFONATION OF LAB	X		
2417	LINEAR ALKYL BENZENE	BENZENE CHLORINATION/ALKYLATION		X	
		BENZENE DEHYDROGENATION/ALKYLATION		X	
2420	MALEIC ACID	BENZENE	X		
2430	MALEIC ANHYDRIDE	AIR OXIDATION OF BENZENE	X	X	
		AIR OXIDATION OF BUTANE	X	X	
		BY-PRODUCT OF OCPBD NO. 2960 (ALL PR.)			
2440	MALIC ACID	MALEIC ACID HYDRATION	X		
2450	MESITYL OXIDE	DEHYDRATION OF DIACETONE ALCOHOL		X	
2455	METANILIC ACID	REDUCTION OF BENZENE SULFONIC ACID	X		
2460	METHACRYLIC ACID	ACETONE CYANOHYDRIN		X	
2490	METHALLYL CHLORIDE	CHLORINATION OF ISOBUTYLENE		X	
2500	METHANOL	REFORMING NATURAL GAS		X	
2510	METHYL ACETATE	ESTERIFICATION OF METHANOL	X		
2520	METHYL ACETOACETATE	BY-PRODUCT OF OCPBD NO. 2410 PROCESS 1		X	
2530	METHYLAMINE	AMMONOLYSIS OF METHANOL		X	
2540	N-METHYLANILINE	REACTION OF ANILINE AND METHANOL		X	
2545	METHYL BROMIDE	HYDROBROMINATION OF METHANOL		X	
2550	METHYL BUTYNOL	REACTION OF ACETYLENE WITH ACETONE	X		
2560	METHYL CHLORIDE	METHANOL HYDRO-CHLORINATION		X	
		METHANE CHLORINATION		X	
2570	METHYL CYCLOHEXANE	REDUCTION OF TOLUENE		X	
2590	METHYLCYCLOHEXANONE	OXIDATION OF METHYL CYCLOHEXANOL		X	
2620	METHYLENE CHLORIDE	METHYL CHLORIDE CHLORINATION		X	
		CO-PRODUCT OF OCPBD NO. 2560 PROCESS 2		X	
2630	METHYLENE DIANILINE	CONDENSATION OF ANILINE AND FORMALDEHYDE		X	
2635	METHYLENE DIPHENYL DIISOCYANATE	PHOSGENATION OF DIPHENYLMETHANE AMINE		X	
2640	METHYLETHYL KETONE	DEHYDROGENATION OF SEC-BUTANOL		X	
		BY-PRODUCT OF OCPBD NO. 70 PROCESS 4	X		
		PETROLEUM EXTRACTANT			X
2645	METHYL FORMATE	ESTERIFICATION OF FORMIC ACID	X		

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
2650	METHYLISOBUTYLCARBINOL	MIBK HYDROGENATION		X	
2660	METHYLISOBUTYL KETONE	MESITYLOXIDE HYDROGENATION		X	
2665	METHYL METHACRYLATE	ACETONE CYANOHYDRIN		X	
2670	METHYL PENTYNOL	ACETYLENE AND 2-BUTANONE	X		
2690	ALPHA-METHYLSTYRENE	DEHYDROGENATION OF CUMENE		X	
		BY-PRODUCT OF OCPDB NO. 2910 PROCESS 1		X	
2700	MORPHOLINE	DEHYDRATION OF DIETHANOLAMINE		X	
2710	1-NAPTHALENE SULFONIC ACID	SULFONATION OF NAPTHALENE	X		
2720	2-NAPTHALENE SULFONIC ACID	SULFONATION OF NAPTHALENE	X		
2730	ALPHA-NAPTHOL	HYDROLYSIS OF NAPTHYLAMINE	X		
2740	BETA-NAPTHOL	PEROXIDATION OF NAPTHALENE	X		
2750	NEOPENTANOIC ACID	CARBOXYLATION OF ISOBUTYLENE	X		
2756	O-NITROANILINE	AMMONOLYSIS OF CHLORONITROBENZENE		X	
		AMMONOLYSIS OF CHLORONITROBENZENE	X		
2757	P-NITROANILINE	CO-PRODUCT OF OCPDB NO. 2756 PROCESS 1		X	
		CO-PRODUCT OF OCPDB NO. 2756 PROCESS 2	X		
2760	O-NITROANISOLE	ALKYLATION OF O-NITROPHENOL	X		
2762	P-NITROANISOLE	NO U.S. PRODUCERS			X
2770	NITROBENZENE	NITRATION OF BENZENE		X	
2780	NITROBENZOIC ACID	NITRATION OF BENZOIL ACID	X		
		OXIDATION OF NITROTOLUENE	X		
2790	NITROETHANE	NITRATION OF PROPANE		X	
2791	NITROMETHANE	CO-PRODUCT OF OCPDB NO. 2790		X	
2792	NITROPHENOL	NITRATION OF PHENOL	X		
2795	NITROPROPANE	CO-PRODUCT OF OCPDB NO. 2790		X	
2800	NITROTOLUENE	NITRATION OF TOLUENE	X		
		NITRATION OF TOLUENE		X	
2810	NONENE	CO-PRODUCT OF OCPDB NO. 1620		X	
2820	NONYLPHENOL	ALKYLATION OF PHENOL		X	
		ALKYLATION OF PHENOL	X		
2830	OCTYL PHENOL	ALKYLATION OF PHENOL	X		
2840	PARALDEHYDE	ACETALDEHYDE CONDENSATION	X		
2850	PENTAERYTHRITOL	FORMALDEHYDE AND ACETALDEHYDE		X	
		FORMALDEHYDE AND ACETALDEHYDE	X		
2851	N-PENTANE	PETROLEUM DERIVATIVE			X
2855	1-PENTENE	PETROLEUM DERIVATIVE			X
2860	PERCHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 810 PROCESS 3		X	
		ETHYLENE DICHLORIDE OXYCHLORINATION		X	
		ETHYLENE DICHLORIDE CHLORINATION		X	
2882	PERCHLOROMETHYLMERCAPTAN	CLASSIFIED AS A PESTICIDE			X
2890	O-PHENETIDINE	NO U.S. PRODUCERS			X

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
2906	P-PHENETIDINE	REDUCTION OF P-NITROPHENOL	X		
2910	PHENOL	CUMENE HYDRO-PEROXIDE CLEAVAGE		X	
		TOLUENE		X	
		COAL TAR DERIVATIVE			X
2920	PHENOLSULFONIC ACIDS	SULFONATION OF PHENOL	X		
2930	PHENYLANTHRANILIC ACID	ANILINE,O-CHLOROBENZOIC ACID	X		
2940	PHENYLENEDIAMINE	AMMONOLYSIS OF O-DICHLOROBENZENE	X		
		REDUCTION OF NITRO-BENZENE	X		
2950	PHOSGENE	CHLORINATION OF CARBON MONOXIDE		X	
2960	PHTHALIC ANHYDRIDE	BASF		X	
		VON HEYDEN		X	
		SHERWIN WILLIAMS/BADGER		X	
		OXIDATION OF NAPTHALENE		X	
2970	PHTHALIMIDE	AMMONOLYSIS OF PHTHALIC ANHYDRIDE	X		
2973	BETA-PICOLINE	ACETALDEHYDE + HCHO AND METHANOL		X	
		COAL TAR DERIVATIVE			X
2976	PIPERAZINE	AMMONOLYSIS OF ETHANOLAMINES		X	
3000	POLYBUTENES	FRIEDEL CRAFTS POLYMERIZATION		X	
3010	POLYETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION/POLYMERIZATION		X	
3025	POLYPROPYLENE GLYCOL	POLY.OF PROPYLENE OX. AND PROPYLENE GLY.		X	
3063	PROPIONALDEHYDE	OXO		X	
3066	PROPIONIC ACID	OXO		X	
		BY-PRODUCT OF OCPDB NO. 70 PROCESS 4		X	
3070	N-PROPYL ALCOHOL	OXO		X	
		OXIDATION OF PROPANE		X	
3075	PROPYLAMINE	NH3 + ALCOHOL, DEHYDRATION CATALYST		X	
		NH3 + ALCOHOL + H2, DEHYDRATION CATALYST		X	
		NH3+ALDEHYDE+H2, HYDROGENATION CATALYST		X	
		HCN + OLEFIN	X		
3080	PROPYL CHLORIDE	HYDROCHLORINATION OF PROPYL ALCOHOL		X	
3090	PROPYLENE	BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)		X	
		REFINERY BY-PRODUCT			X
3100	PROPYLENE CHLOROHYDRIN	HYDROCHLORINATION OF PROPYLENE	X		
3110	PROPYLENE DICHLORIDE	BY-PRODUCT OF OCPDB NO. 3100		X	
3111	PROPYLENE GLYCOL	HYDRATION OF PROPYLENE OXIDE	X		
3120	PROPYLENE OXIDE	PROPYLENE CHLOROHYDRIN + BASE		X	
		ISOBUTANE PEROXIDATION		X	
3130	PYRIDINE	CO-PRODUCT OF OCPDB NO. 3230 PROCESS 2		X	
3140	QUINONE	CO-PRODUCT OF OCPDB NO. 2973 PROCESS 1		X	
		OXIDATION OF ANILINE		X	

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
3140	QUINONE	OXIDATION OF ANILINE	X		
3150	RESORCINOL	NEUTRAL. OF BENZENE DISULFONIC ACID	X		
3160	RESORCYLIC ACID	RESORCINOL	X		
3170	SALICYLIC ACID	SODIUM PHENATE	X		
3180	SODIUM ACETATE	NEUTRALIZATION OF ACETIC ACID	X		
3181	SODIUM BENZOATE	NEUTRALIZAION OF BENZOIC ACID	X		
3190	SODIUM CARBOXYMETHYL CELLULOSE	CELLULOSE	X		
		CELLULOSE		X	
3191	SODIUM CHLOROACETATE	NEUTRALIZAITON OF CHLOROACETIC ACID	X		
3200	SODIUM FORMATE	CARBONMONOXIDE + SODIUM HYDROXIDE		X	
3210	SODIUM PHENATE	NEUTRALIZATION OF PHENOL	X		
3220	SORBIC ACID	OXIDATION OF 2,4-HEXADIENAL		X	
		KETENE + CROTONALDEHYDE	X		
3230	STYRENE	DEHYDROGENATION OF ETHYL BENZENE		X	
		ETHYL BENZENE HYDROPEROXIDE + PROPYLENE		X	
3240	SUCCINIC ACID	HYDROGENATION OF MALEIC ANHYDRIDE	X		
3250	SUCCINONITRILE	REACTING ACRYLONITRILE WITH HCN	X		
3251	SULFANILIC ACID	SULFONATION OF ANILINE	X		
3260	SULFOLANE	ADDITION OF SO2 TO BUTADIENE		X	
3270	TANNIC ACID	EXTRACTION FROM NATURAL SOURCES			X
3280	TEREPHTHALIC ACID	OXIDATION OF P-XYLENE		X	
		HYDROLYSIS OF DMT		X	
3290	TETRACHLOROETHANES	NO U.S. PRODUCERS			X
3300	TETACHLOROPHTHALIC ANHYDRIDE	CHLORINATION OF PHTHALIC ANHYDRIDE	X		
3310	TETRAETHYL LEAD	ALKYLATION OF LEAD		X	
		ALKYLATION OF LEAD	X		
		GRIGNARD-ELECTROLYSIS	X		
3320	TETRAHYDRONAPTHALENE	HYDROGENATION OF NAPTHALENE		X	
3330	TETRAHYDROPHTHALIC ANHYDRIDE	BUTADIENE + MALEIC ANHYDRIDE	X		
3335	TETRAMETHYL LEAD	MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR1		X	
		MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR2	X		
		MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR3	X		
3340	TETRAMETHYLENEDIAMINE	NO U.S. PRODUCERS			X
3341	TETRAMETHYLETHYLENEDIAMINE	DICHLOROETHANE + DIMETHYLAMINE	X		
3349	TOLUENE	CO-PRODUCT OF OCPDB NO. 380 PROCESS 1			X
		COAL TAR DERIVATIVE			X
		BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)		X	
3350	TOLUENE 1,4, DIAMINE	HYDROGENATION OF DINITROTOLUENES	X		
3354	TOLUENE 2,4, DIISOCYANATE	PHOSGENATION OF TOLUENEDIAMINE	X		
3355	TOLUENE DIISOCYANATES (MIXTURE)	MULTIPLE PRODUCT WITH OCPDB NO. 3354		X	

(CONTINUED)

Table A-1. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	BATCH	CONTINUOUS	NOT IN SOCMI
3360	TOLUENE SULFONAMIDE	AMMONOLYSIS OF TOLUENE SULFONYL CHLORIDE	X		
3370	TOLUENE SULFONIC ACIDS	TOLUENE SULFONATION	X		
3380	TOLUENE SULFONYL CHLORIDE	TOLUENE AND CHLOROSULFONIC ACID		X	
3481	TOLUIDINES	REDUCTION OF NITROTOLUENES	X		
		HYDROGENATION OF NITROTOLUENES		X	
3390	TRICHLOROBENZENES	CHLORINATION OF DICHLOROBENZENE	X		
3395	1,1,1-TRICHLOROETHANE	HYDROCHLORINATION OF VINYL CHLORIDE		X	
		ETHANE CHLORINATION		X	
3400	1,1,2-TRICHLOROETHANE	CHLORINATION OF ETHYLENE DICHLORIDE		X	
3410	TRICHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 2860 PROCESS 2		X	
		CO-PRODUCT OF OCPDB NO. 2860 PROCESS 3		X	
3411	TRICHLOROFLUOROMETHANE	CO-PRODUCT OF OCPDB NO. 1221		X	
3420	1,2,3 TRICHLOROPROPANE	CHLORINATION OF PROPYLENE		X	
3430	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	HYDROFLUORINATION OF PERCHLOROETHYLENE		X	
3450	TRIETHYLAMINE	CO-PRODUCT OF OCPDB NO. 1700		X	
3460	TRIETHYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 1830		X	
3470	TRIETHYLENE GLYCOL DIMETHYL ETHER	TRIETHYLENE GLY. MONOETHER+METHYLCHLOR.	X		
3480	TRIISOBUTYLENE	CO-PRODUCT OF OCPDB NO. 1440 PN 1 AND 2		X	
3490	TRIMETHYLAMINE	CO-PRODUCT OF OPCDB NO. 2530		X	
3500	UREA	ONCE THROUGH		X	
		PARTIAL SOLUTION RECYCLE		X	
		TOTAL RECYCLE		X	
3510	VINYL ACETATE	ACETYLENE AND ACETIC ACID		X	
		ETHYLENE AND ACETIC ACID		X	
3520	VINYL CHLORIDE	DEHYDROCHLORINATION OF EDC		X	
		HYDROCHLORINATION OF ACETYLENE		X	
3530	VINYLIDENE CHLORIDE	DEHYDROCHLORINATE 1,1,2-TRICHLOROETHANE		X	
3540	VINYL TOLUENE	TOLUENE + ETHYLENE		X	
3541	XYLENES (MIXED)	CO-PRODUCT OF OCPDB NO. 380 PROCESS 1			X
		NAPTHA		X	
		COAL TAR DERIVATIVE			X
3560	O-XYLENE	BY-PRODUCT OF OCPDB NO. 3541 (ALL PR.)			X
3570	P-XYLENE	BY-PRODUCT OF OCPDB NO. 3541 (ALL PR.)			X
3580	XYLENOL	BY-PRODUCT OF OCPDB NO. 1010 PROCESS 2		X	
3590	XYLIDINES	NITRATION OF MIXED XYLENE	X		

Table A-2. Generally Batch Operated Facilities in SOCMI

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
					DISTILLATION ABSORPTION STRIPPING EXTRACTION CRYSTALLIZATION DRYING REACTION SEPARATION FILTRATION EVAPORATION DISTILLATION LIQUID-LIQUID EXTRACTION					
20	ACETAL	ACETALDEHYDE AND ETHANOL	2	CONDENSATION	X	1	-	-	-	-
40	ACETALDOL	ACETALDEHYDE SELF CONDENSATION	2	CONDENSATION NEUTRALIZATION	X	1	-	-	-	-
50	ACETAMIDE	ETHYL ACETATE AMMONOLYSIS	2	AMMONOLYSIS	X X	2	1	1977	-	-
65	ACETANILIDE	ANILINE AND ACETIC ACID	2	ACETYLATION	X X X	2	2	1975	-	-
		ANILINE AND ACETYLCHLORIDE	2	ACETYLATION	X X X	2	1	1975	-	-
90	ACETONE	BY-PRODUCT OF OCPDB NO. 2740	1			1	-	-	10	1979
		BY-PRODUCT OF OCPDB NO. 2200 PROCESS 1	1			1	-	-	10	1979
110	ACETONITRILE	UNSPECIFIED	2			1	-	19 -	-	-
120	ACETOPHENONE	ETHYL BENZENE OXIDATION	2	OXIDATION NEUTRALIZATION DEHYDROGENATION	X X X	2	1	1974	-	-
125	ACETYL CHLORIDE	ACETIC ACID CHLORINATION	2	CHLORINATION	X	2	1	1979	-	-
150	ACRYLAMIDE	ACRYLONITRILE AND SULFURIC ACID	1	HYDRATION NEUTRALIZATION	X X X	1	15	1977	30	1978
180	ADIPIC ACID	CYCLOHEXANOL OXIDATION	1	OXIDATION	X X X X	5	-	-	1910	1979
220	AMINOBENZOIC ACID	NITROBENZOIC ACIDS	2	REDUCTION	X X	2	-	-	-	-
235	P-AMINOPHENOL	NITROBENZENE/SULFURIC ACID	2	REARRANGEMENT HYDROGENATION		1	-	-	-	-
		NITROPHENOL REDUCTION	2	REDUCTION		2	-	-	-	-
280	AMYL MERCAPTAN	AMYL CHLORIDE AND HYDROSULFIDE	2	SULFONATION	X	1	-	-	-	-
290	AMYL PHENOL	PHENOL ALKYLATION	2	ALKYLATION	X X X	3	-	-	-	-
310	ANILINE HYDROCHLORIDE	ANILINE AND HCL	2	NEUTRALIZATION	X	1	-	-	-	-
320	ANISIDINE (S)	NITROANISOLE REDUCTION	2	REDUCTION	X	2	-	-	-	-
330	ANISOLE	PHENATE SALT ALKYLATION	2	ALKYLATION		2	-	-	-	-
340	ANTHRANILIC ACID	PHTHALIMIDE	2	HYDRATION ACIDIFICATION	X X	1	1	1961	-	-
360	BENZALDEHYDE	BENZALCHLORIDE HYDROLYSIS	2	HYDROLYSIS NEUTRALIZATION	X X X	2	4	1978	-	-
370	BENZAMIDE	BENZOYLCHLORIDE AND NH3	2	ACYLATION	X X	2	-	-	-	-
390	BENZENE DISULFONIC ACIDS	BENZENE SULFONIC ACID	2	SULFONATION	X	1	-	-	30	1979
400	BENZENE SULFONIC ACID	BENZENE SULFONATION	2	SULFONATION	X X X	2	-	-	-	-
410	BENZIL	BENZOIN OXIDATION	2	OXIDATION	X X	2	-	-	-	-
420	BENZILIC ACID	BENZIL REARRANGEMENT	2	REARRANGEMENT NEUTRALIZATION	X X	1	-	-	-	-
440	BENZOIN	BENZALDEHYDE	2	CONDENSATION REDUCTION	X X X X	2	-	-	-	-
460	BENZOPHENONE	BENZENE AND CCL4	2	ALKYLATION HYDROLYSIS	X X X X	6	1	1976	-	-
480	BENZOTRICHLORIDE	BY-PRODUCT OF OCPDB NO. 530 PROCESS 1	2			1	10	1976	-	-
490	BENZOYL CHLORIDE	BENZOTRICHLORIDE	2	HYDROLYSIS	X	2	19	1974	-	-
500	BENZYL ALCOHOL	BENZYL CHLORIDE HYDROLYSIS	2	HYDROLYSIS	X X	2	9	1976	-	-
510	BENZYL AMINE	BENZYL CHLORIDE AMMONOLYSIS	2	AMMONOLYSIS	X X	2	-	-	-	-
520	BENZYL BENZOATE	BENZALDEHYDE	2	ESTERIFICATION		2	1	1974	-	-
		BENZOIC ACID AND BENZYL ALCOHOL	2	ESTERIFICATION		2	1	1974	-	-
530	BENZYL CHLORIDE	TOLUENE CHLORINATION	2	OXIDATION REDUCTION CHLORINATION NEUTRALIZATION	X X	2	9	1978	17	1978
540	BENZYL DICHLORIDE	CO-PRODUCT OF OCPDB NO. 530 PROCESS 2	2			2	4	1977	-	-
570	BROMOBENZENE	BENZENE BROMINATION	2	BROMINATION	X X	2	-	-	-	-
580	BROMONAPTHALENE	NAPTHALENE BROMINATION	2	BROMINATION	X X	2	-	-	-	-
650	N-BUTYL ACETATE	BUTANOL ESTERIFICATION	1	ESTERIFICATION	X X X	3	-	-	170	1979
780	BUTYRONITRILE	PROPYL CHLORIDE AND HCN	2	HYDROCYANATION	X	1	-	-	-	-

(CONTINUED)

Table A-2. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS: DISTILLATION	DISSOCIATION	EXTRACTION	REARRANGEMENT	DEHYDROBROMINATION	DEMETHYLATION	SULFONATION	CHLORINATION	ESTERIFICATION	HYDROLYSIS	NEUTRALIZATION	HYDROGENATION	OXIDATION	DEHYDRATION	ISOMERIZATION	ALKYLATION	CONDENSATION	AMMONOLYSIS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
785	CAPROLACTAM	CYCLOHEXANONE	1	OXIDATION REARRANGEMENT NEUTRALIZATION	X	X	X	X	X	X	X	X											3	780	1976	1125	1978
800	CARBON TETRABROMIDE	CCL4 AND HYDROGEN BROMIDE	2	DEHYDROBROMINATION	X	X					X		X										4	-	-	-	-
820	CELLULOSE ACETATE	CELLULOSE ESTERIFICATION	1	HYDROLYSIS ESTERIFICATION	X	X		X			X	X	X										5	-	-	930	1976
840	CHLOROACETIC ACID	ACETIC ACID CHLORINATION	1	CHLORINATION				X	X			X											4	-	-	99	1979
850	M-CHLOROANILINE	CHLORONITROBENZENE	2	REDUCTION																			1	-	-	-	-
860	O-CHLOROANILINE	CHLOROACETANILIDE ACIDIFICATION	2	HYDRATION																			2	-	-	-	-
870	P-CHLOROANILINE	CO-PRODUCT OF OCPDB NO. 860	2																				2	-	-	-	-
880	CHLOROBENZALDEHYDE	P-CHLORO TOLUENE	2	OXIDATION	X																		1	-	-	-	-
890	CHLOROBENZENE	BENZENE CHLORINATION	1	CHLORINATION	X	X		X				X											1	10	1978	20	1979
900	CHLOROBENZOIC ACID	CHLOROTOLUENE CHLORINATION/HYDROLYSIS	2	NEUTRALIZATION CHLORINATION HYDROLYSIS	X	X																	2	-	-	-	-
910	CHLOROBENZOYL CHLORIDE	CHLOROBENZOIC ACID	2	PHOSGENATION	X																		1	-	-	-	-
960	CHLOROPHENOLS (O,M,P)	PHENOL CHLORINATION	2	CHLORINATION NEUTRALIZATION	X		X																5	-	-	-	-
980	O-CHLOROTOLUENE	TOLUENE CHLORINATION	2	CHLORINATION	X			X				X											1	-	-	-	-
990	P-CHLOROTOLUENE	CO-PRODUCT OF OCPDB NO. 980	2																				1	-	-	-	-
1100	CYANURIC ACID	UREA PYROLYSIS	2	PYROLYSIS		X		X				X											2	-	-	-	-
1150	CYCLOHEXYLAMINE	ANILINE HYDROGENATION	1	HYDROGENATION	X											X							4	-	-	20	1979
1200	DIAMINOBENZOIC ACID	DINITROBENZOIC ACID	2	HYDROGENATION				X								X							1	-	-	-	-
1210	DICHLOROANILINE	DICHLORONITROBENZENE	2	NITRATION REDUCTION NEUTRALIZATION	X											X							3	66	1976	-	-
1215	M-DICHLOROBENZENE	DCB ISOMERIZATION	2	ISOMERIZATION	X														X				1	-	-	-	-
1216	O-DICHLOROBENZENE	CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	1																				7	-	-	138	1979
1220	P-DICHLOROBENZENE	CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	1	CHLORINATION NEUTRALIZATION				X															7	37	1976	168	1979
1240	DICHLOROETHYL ETHER	ETHYL ETHER CHLORINATION	2	CHLORINATION																			2	-	-	-	-
1305	DIETHYLENE GLYCOL DIMETHYL ETHER	DEG METHYL ETHER AND METHYL CHLORIDE	0	ALKYLATION	X																		29	-	-	-	-
1442	DIISODECYL PHTHALATE	PHTHALIC ANHYDRIDE AND ISODECANOL	0	ESTERIFICATION	X								X	X									10	16	19 7	7 -	-
1444	DIISOCTYL PHTHALATE	PHTHALIC ANHYDRIDE AND ISOOCTANOL	0	ESTERIFICATION	X								X	X									10	4	19 7	7 -	-
1470	DIMETHYL ANILINE	ANILINE AND METHANOL	1	CONDENSATION	X					X													3	14	1976	-	-
1510	DIMETHYL SULFIDE	LIGNIN DEMETHYLATION	2	DEMETHYLATION																			1	-	-	-	-
1540	3,5 DINITROBENZOIC ACID	BENZOIC ACID NITRATION	2	NITRATION NEUTRALIZATION	X	X																	4	-	-	-	-
1545	DINITROPHENOL	CO-PRODUCT OF OCPDB NO. 2792	2																				3	1	1975	-	-
1560	DIOXANE	ETHYLENE GLYCOL	2	SULFONATION	X						X												4	15	1976	-	-
1580	DIPHENYLAMINE	ANILINE CONDENSATION	1	CONDENSATION	X	X					X												3	40	1974	-	-
1600	DIPHENYL THIOUREA	ANILINE CONDENSATION	1	CONDENSATION				X	X		X												2	-	-	-	-
1630	DODECYLANILINE	DODECYL ALCOHOL	2	AMMONOLYSIS																			1	-	-	-	-
1640	DODECYLPHENOL	PHENOL ALKYLATION	2	ALKYLATION	X	X		X															1	-	-	-	-
1730	ETHYL CELLULOSE	CELLULOSE AND CAUSTIC	1	ALKYLATION	X	X						X											3	11	1976	-	-
1750	ETHYL CHLOROACETATE	CHLOROACETIC ACID ESTERIFICATION	2	ESTERIFICATION	X																		1	-	-	-	-
1760	ETHYL CYANOACETATE	CYANOACETIC ACID	2	ESTERIFICATION	X	X		X															2	-	-	-	-
1870	ETHYLENE GLYCOL DIMETHYL ETHER	EGMME AND METHYL CHLORIDE	2	ALKYLATION	X																		1	1	1977	-	-
1950	ETHYLENE GLYCOL MONOPHENYL ETHER	ETHYLENE OXIDE AND PHENOL	2	ALKYLATION	X																		1	-	-	-	-
2010	ETHYL ORTHOFORMATE	HCN + ETHANOL + HCL	2	ALCOHOLYSIS	X																		1	-	-	-	-
2020	ETHYL OXALATE	OXALIC ACID ESTERIFICATION	2	DEHYDRATION ESTERIFICATION	X																		2	-	-	-	-
2030	ETHYL SODIUM OXALACETATE	ETHYL ACETATE	2	ESTERIFICATION				X				X											1	-	-	-	-
2050	FORMAMIDE	AMMONOLYSIS METHYL FORMATE	2	AMMONOLYSIS	X																		1	-	-	-	-
2070	FUMARIC ACID	BY-PRODUCT OF OCPDB NO. 2440	1																				0	-	-	6	1979

(CONTINUED)

Table A-2. (Continued)

| OCPSD NO. | CHEMICAL | PROCESS | DATA QUALITY | MAJOR UNIT PROCESSES | UNIT OPERATIONS | | |

Table A-2. (Continued)

OCPSD NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
3075	PROPYLAMINE	HCN + OLEFIN	2	HYDROCYANATION HYDROGENATION	X	1	-	-	-	-
3100	PROPYLENE CHLOROHYDRIN	HYDROCHLORINATION OF PROPYLENE	1	HYDROCHLORINATION	X X	1	-	-	-	-
3111	PROPYLENE GLYCOL	HYDRATION OF PROPYLENE OXIDE	1	HYDRATION	X	4	-	-	890	1979
3140	QUINONE	OXIDATION OF ANILINE	2	OXIDATION		1	-	-	-	-
3150	RESACINOL	NEUTRAL. OF BENZENE DISULFONIC ACID	1	NEUTRALIZATION FUSION	X X X X X	1	34	1974	40	1979
3160	RESACYLIC ACID	RESORCINOL	2	ACIDIFICATION FUSION CARBOXYLATION	X X X	2	-	-	-	-
3170	SALICYLIC ACID	SODIUM PHENATE	1	ACIDIFICATION FUSION CARBOXYLATION	X X X X X X	4	44	1977	51	1979
3180	SODIUM ACETATE	NEUTRALIZATION OF ACETIC ACID	2	ACIDIFICATION NEUTRALIZATION	X X	9	21	1979	53	1979
3181	SODIUM BENZOATE	NEUTRALIZATION OF BENZOIC ACID	2	NEUTRALIZATION	X X	7	12	1975	-	-
3190	SODIUM CARBOXYMETHYL CELLULOSE	CELLULOSE	1	ETHERIFICATION ACIDIFICATION	X X	4	13	1976	18	1979
3191	SODIUM CHLOROACETATE	NEUTRALIZATION OF CHLOROACETIC ACID	2	ACIDIFICATION NEUTRALIZATION	X X	1	-	-	-	-
3210	SODIUM PHENATE	NEUTRALIZATION OF PHENOL	1	NEUTRALIZATION	X X X X	6	-	-	-	-
3220	SORBIC ACID	KETENE + CROTONALDEHYDE	2	CONDENSATION OXIDATION		2	-	-	-	-
3240	SUCCINIC ACID	HYDROGENATION OF MALEIC ANHYDRIDE	1	HYDROGENATION	X X	3	-	-	-	-
3250	SUCCINONITRILE	REACTING ACRYLONITRILE WITH HCN	2	HYDROCYANATION	X	1	-	-	-	-
3251	SULFANILIC ACID	SULFONATION OF ANILINE	1	SULFONATION ACIDIFICATION	X X X X	2	-	-	-	-
3300	TETRACHLOROPHTHALIC ANHYDRIDE	CHLORINATION OF PHTHALIC ANHYDRIDE	2	CHLORINATION		1	7	1977	-	-
3310	TETRAETHYL LEAD	ALKYLATION OF LEAD GRIGNARD-ELECTROLYSIS	1 1	ALKYLATION GRIGNARD ALKYLATION	X X X X X	4 1	235 30	1977 1977	450 80	-
3330	TETRAHYDROPHTHALIC ANHYDRIDE	BUTADIENE + MALEIC ANHYDRIDE	1	DIELS-ALDER	X	1	3	1979	-	-
3335	TETRAMETHYL LEAD	MULTIPLE PRODUCT WITH OCPSD NO. 3310 PR2	0			0	-	-	-	-
		MULTIPLE PRODUCT WITH OCPSD NO. 3310 PR3	0			0	-	-	-	-
3341	TETRAMETHYLETHYLENEDIAMINE	DICHLOROETHANE + DIMETHYLAMINE	2	ADDITION		4	-	-	-	-
3350	TOLUENE 1,4- DIAMINE	HYDROGENATION OF DINITROTOLUENES	1	HYDROGENATION	X X X	9	-	-	750	1979
3354	TOLUENE 2,4- DIISOCYANATE	PHOSGENATION OF TOLUENEDIAMINE	1	PHOSGENATION	X	9	600	1977	750	1979
3360	TOLUENE SULFONAMIDE	AMMONOLYSIS OF TOLUENE SULFONYL CHLORIDE	1	AMMONOLYSIS		2	-	-	-	-
3370	TOLUENE SULFONIC ACIDS	TOLUENE SULFONATION	1	SULFONATION	X	7	20	1978	-	-
3391	TOLUIDINES	REDUCTION OF NITROTOLUENES	1	REDUCTION	X X X	2	-	-	-	-
3399	TRICHLOROBENZENES	CHLORINATION OF DICHLOROBENZENE	1	CHLORINATION	X	4	-	-	-	-
3470	TRIETHYLENE GLYCOL DIMETHYL ETHER	TRIETHYLENE GLY. MONOETHER+METHYLCHLOR.	2	NEUTRALIZATION CONDENSATION		1	-	-	-	-
3590	XYLIDINES	NITRATION OF MIXED XYLENE	2	NITRATION HYDROGENATION ACIDIFICATION	X	3	-	-	-	-

Table A-3. Generally Continuously Operated Facilities in SOCMI

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
					DAISTILRP EESXTORBC VCARQCRT CRYSTGEN DSMEIAGR CISFUNCE DIODMILT					
30	ACETALDEHYDE	ETHYLENE OXIDATION	1	OXIDATION NEUTRALIZATION	X X X X	3	-	-	1400	1978
		ETHANOL OXIDATION	1	OXIDATION		1	-	-	5	1978
		CO-PRODUCT OF OCPDB NO. 140	1			1	-	-	5	1979
70	ACETIC ACID	METHANOL CARBONYLATION	1	CARBONYLATION		3	-	-	1115	1977
		PERACETIC ACID AND ALLYL CHLORIDE	1	OXIDATION		1	-	-	90	1977
		ACETALDEHYDE OXIDATION	1	OXIDATION		3	-	-	1175	1979
		N-BUTANE OXIDATION	1	OXIDATION ALKYLATION	X X X	2	-	-	1190	1979
		BY-PRODUCT OF OCPDB NO. 2090 PROCESS 2	1			1	-	-	40	1977
80	ACETIC ANHYDRIDE	ACETIC ACID PYROLYSIS	1	PYROLYSIS	X X	3	-	-	1770	1977
90	ACETONE	CO-PRODUCT OF OCPDB NO. 2910 PROCESS 1	1			11	-	-	1972	1979
		ISOPROPANOL DEHYDRATION	1	DEHYDRATION		5	-	-	890	1979
		ISOPROPANOL OXIDATION	1	OXIDATION		1	-	-	100	1979
		BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	1			1	-	-	40	1979
100	ACETONE CYANOHYDRIN	ACETONE AND HCN	1	HYDROCYANATION NEUTRALIZATION	X X X	3	867	1978	1164	1978
110	ACETONITRILE	BY-PRODUCT OF OCPDB NO. 170	1			2	150	1973	-	-
120	ACETOPHENONE	CO-PRODUCT OF OCPDB NO. 2910 PROCESS 1	1			4	2	1974	-	-
130	ACETYLENE	METHANE PYROLYSIS	1	PYROLYSIS	X X X	3	-	-	204	1979
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	1			4	-	-	44	1979
140	ACROLEIN	PROPYLENE OXIDATION	1	OXIDATION	X	2	61	1974	115	1978
150	ACRYLAMIDE	CATALYTIC HYDRATION OF VCN	1	HYDRATION	X X X	4	53	1977	110	1978
160	ACRYLIC ACID AND ESTERS	MODIFIED REPPE	1	CARBONYLATION ESTERIFICATION		1	-	-	50	1979
		PROPYLENE OXIDATION	1	OXIDATION ESTERIFICATION	X X X X	4	-	-	1004	1979
170	ACRYLONITRILE	PROPYLENE AMMOXIDATION	1	AMMOXIDATION	X X X	6	-	-	2145	1979
180	ADIPIC ACID	CYCLOHEXANOL OXIDATION	1	OXIDATION	X X X X	5	-	-	1910	1979
185	ADIPONITRILE	ACRYLONITRILE ELECTROHYDRODIMERIZATION	1	DIMERIZATION		1	-	-	150	1978
		BUTADIENE CHLORINATION	1	HYDROGENATION CHLORINATION	X	2	-	-	-	19 -
		CYCLOHEXANE	2	AMMOXIDATION DEHYDRATION OXIDATION		3	-	-	-	19 -
200	ALLYL ALCOHOL	PROPYLENE OXIDE ISOMERIZATION	1	ISOMERIZATION		1	-	-	-	-
		ALLYLCHLORIDE HYDROLYSIS	1	HYDROLYSIS		1	-	-	-	-
210	ALLYL CHLORIDE	PROPYLENE CHLORINATION	1	CHLORINATION		5	-	-	499	1979
230	AMINOETHYLETHANOLAMINE	ETHYLENE OXIDE AND EDA	1	CONDENSATION	X X X	3	14	1974	-	-
240	AMYL ACETATES	AMYL ALCOHOL ESTERIFICATION	2	ESTERIFICATION		2	12	1973	-	-
250	AMYL ALCOHOLS	OXO PROCESS	1	REDUCTION CARBONYLATION		1	60	1978	-	-
		AMYLCHLORIDE HYDROLYSIS	2	HYDROLYSIS		5	-	19 -	-	-
260	AMYL AMINE	AMYL ALCOHOL AMMONOLYSIS	1	AMMONOLYSIS		3	2	1976	-	-
270	AMYL CHLORIDE	PENTANE CHLORINATION	2	CHLORINATION		5	-	-	-	-
300	ANILINE	NITROBENZENE HYDROGENATION	1	HYDROGENATION	X X X X	7	-	-	1160	1979
350	ANTHRAQUINONE	ANTHRACENE OXIDATION	1	OXIDATION		1	4	1977	-	-
360	BENZALDEHYDE	TOLUENE OXIDATION	2	OXIDATION		3	5	1978	-	-
380	BENZENE	TOLUENE HYDRODEALKYLATION	1	DEALKYLATION	X X X	15	-	-	4176	1979
		TOLUENE DISPROPORTIONATION	1	REARRANGEMENT		2	-	-	140	1979
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			0	-	-	2534	1979
400	BENZENE SULFONIC ACID	BENZENE SULFONATION	2	SULFONATION		2	-	-	-	-
430	BENZOIC ACID	TOLUENE OXIDATION	1	OXIDATION	X X X X X X	6	80	1976	281	1979
450	BENZONITRILE	TOLUENE AMMOXIDATION	2	AMMOXIDATION		1	-	-	-	-
460	BENZOTRICHLORIDE	BY-PRODUCT OF OCPDB NO. 530 PROCESS 1	2			3	41	1976	-	-

(CONTINUED)

Table A-3. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
530	BENZYL CHLORIDE	TOLUENE CHLORINATION	2	CHLORINATION NEUTRALIZATION	X X	2	181	1978	160	1978
540	BENZYL DICHLORIDE	CO-PRODUCT OF OCPDB NO. 530 PROCESS 1	2			2	40	1977	-	-
550	DIPHENYL	CO-PRODUCT OF OCPDB NO. 380 PROCESS 3	1			5	42	1976	-	-
560	BISPHENOL A	BENZENE DEHYDROGENATION	1	DEHYDROGENATION	X X X	1	14	1976	-	-
590	BUTADIENE	PHENOL/ACETONE	1	CONDENSATION	X X X X	5	456	1977	910	1979
		N-BUTENE DEHYDROGENATION	1	DEHYDROGENATION		4	-	-	1798	1979
		N-BUTANE (HOUDRY)	1	DEHYDROGENATION	X X X X X	3	-	-	1040	1979
592	N-BUTENE	CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	1			14	-	-	1470	1979
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	1			3	91	1978	-	-
		ALPHA-OLEFINS	1	PYROLYSIS		1	6	1978	-	-
630	N-BUTYL ACRYLATE	MODIFIED REPP	1	CARBONYLATION OXIDATION ESTERIFICATION	X X	1	-	-	58	1978
		BUTANOL AND ACRYLIC ACID	1	ESTERIFICATION		4	247	1978	-	19 -
640	N-BUTYL ALCOHOL	OXO PROCESS	1	HYDROFORMYLATION REDUCTION	X X	6	-	-	985	1979
		CROTONALDEHYDE HYDROGENATION	1	CONDENSATION HYDROGENATION	X X X	2	-	-	10	1979
650	S-BUTYL ALCOHOL	BUTENE HYDRATION	2	HYDRATION	X X X	4	-	-	825	1979
660	T-BUTYL ALCOHOL	BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	1			1	-	-	664	1978
		ISOBUTYLENE	1	HYDROLYSIS	X X	1	12	1978	-	19 -
670	N-BUTYLAMINE	BUTYRALDEHYDE	2	HYDROGENATION AMMONOLYSIS	X	3	4	1976	-	-
680	S-BUTYLAMINE	BUTANOL AND AMMONIA	1	AMMONOLYSIS	X	3	-	-	-	-
690	T-BUTYLAMINE	ISOBUTYLENE AND HCN	2	HYDROGENATION HYDROCYANATION	X	1	18	1978	-	-
700	P-T-BUTYL BENZOIC ACID	TOLUENE/ISOBUTYLENE OXIDATION	2	OXIDATION ALKYLATION		1	10	1978	-	-
710	1,3-BUTYLENE GLYCOL	ACETALDOL HYDROGENATION	2	HYDROGENATION		3	39	1976	-	-
750	N-BUTYRALDEHYDE	OXO PROCESS	1	HYDROFORMULATION	X X	6	749	1976	-	-
760	BUTYRIC ACID	CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	1			1	-	-	-	-
		N-BUTYRALDEHYDE OXIDATION	2	OXIDATION	X X	2	21	1977	-	-
770	BUTYRIC ANHYDRIDE	BUTYRIC ACID AND KETENE	2	CONDENSATION		1	-	-	-	-
785	CAPROLACTAM	CYCLOHEXANONE	1	OXIDATION REARRANGEMENT NEUTRALIZATION	X X X X X X X	3	700	1976	1125	1978
790	CARBON DISULFIDE	METHANE AND SULFUR	1	DEHYDROGENATION CONDENSATION	X X X	5	512	1977	850	1979
810	CARBON TETRACHLORIDE	CARBON DISULFIDE CHLORINATION	1	CHLORINATION NEUTRALIZATION	X X X	1	-	-	500	1977
		METHANE CHLORINATION	1	CHLORINATION	X X X	5	-	-	317	1977
		HYDROCARBON CHLORINOLYSIS	1	CHLORINOLYSIS	X X X	3	-	-	716	1977
820	CELLULOSE ACETATE	CELLULOSE ESTERIFICATION	1	HYDROLYSIS ESTERIFICATION	X X X X X	5	-	-	930	1976
890	CHLOROBENZENE	BENZENE CHLORINATION	1	CHLORINATION NEUTRALIZATION	X X X X	5	340	1978	680	1979
920	CHLORODIFLUOROETHANE	DIFLUROETHANE CHLORINATION	2	CHLORINATION	X X X X X	3	-	-	-	-
921	CHLORODIFLUOROMETHANE	CHLOROFORM FLUORINATION	1	FLUORINATION	X X X X X	8	200	1978	-	-
930	CHLOROFORM	CO-PRODUCT OF OCPDB NO. 810 PROCESS 2	1			3	-	-	170	1979
		METHYLCHLORIDE CHLORINATION	1	CHLORINATION		6	-	-	345	1979
950	O-CHLORONITROBENZENE	CHLOROBENZENE NITRATION	2	NITRATION	X X	2	-	-	86	1979
951	P-CHLORONITROBENZENE	CO-PRODUCT OF OCPDB NO. 950	2			2	140	1974	160	1979
964	CHLOROPRENE	BUTADIENE CHLORINATION	1	CHLORINATION ISOMERIZATION DEHYDROCHLORINATION	X X X X	3	405	1979	578	1979

(CONTINUED)

Table A-3. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
					DISTILLATION ABSORPTION STRIPPING EXTRACTION CRYSTALLIZATION DRYING MIXING FILTRATION EVAPORATION DISTILLATION HEATING COOLING					
992	CHLORODIFLUOROMETHANE	CHLORODIFLUOROMETHANE PYROLYSIS	2	CATALYTIC CRACKING	X X X Y X	3	24	1975	-	-
1010	O-CRESOL	PHENOL METHYLATION	1	ALKYLATION	X X X	1	5	1978	8	1978
1020	P-CRESOL	TOLUENE SULFONATION	1	SULFONATION FUSION ACIDIFICATION	X X	1	21	1978	-	-
1021	MIXED CRESOLS	PHENOL METHYLATION	1	ALKYLATION		2	10	1978	-	-
1030	CRESYLIC ACID	CO-PRODUCT OF OCPDB NO. 1021 PROCESS 1	1			2	-	-	55	1978
1040	CROTONALDEHYDE	ACETALDEHYDE CONDENSATION	1	CONDENSATION DEHYDRATION	X X X X	2	-	-	-	-
1050	CROTONIC ACID	CROTONALDEHYDE OXIDATION	1	OXIDATION		1	5	1977	-	-
1060	CUMENE	BENZENE ALKYLATION	1	ALKYLATION		13	2770	1978	4940	1979
1070	CUMENE HYDROPEROXIDE	CUMENE OXIDATION	1	OXIDATION		13	3200	1976	-	-
1080	CYANOACETIC ACID	SODIUM CHLOROACETATE	1	HYDROCYANATION NEUTRALIZATION	X	1	-	-	-	-
1090	CYANOGEN CHLORIDE	HCN CHLORINATION	2	CHLORINATION		1	-	-	-	-
1110	CYANURIC CHLORIDE	CYANOGEN CHLORIDE	1	POLYMERIZATION		4	159	1977	-	-
1120	CYCLOHEXANE	BENZENE HYDROGENATION	1	HYDROGENATION	X X	10	-	-	2823	1979
1130	CYCLOHEXANOL	CYCLOHEXANE OXIDATION	1	OXIDATION NEUTRALIZATION SAPONIFICATION	X X	6	-	-	2035	1979
1140	CYCLOHEXANONE	PHENOL HYDROGENATION	1	HYDROGENATION		3	-	-	490	1979
		CO-PRODUCT OF OCPDB NO. 1130 PROCESS 1	1			6	-	-	2035	1979
		CO-PRODUCT OF OCPDB NO. 1130 PROCESS 2	1			3	-	-	490	1979
1150	CYCLOHEXENE	CYCLOHEXANOL DEHYDRATION	2	DEHYDRATION		2	-	-	-	-
1170	CYCLOOCTADIENE	BUTADIENE DIMERAZATION	2	DIMERIZATION	X X	1	20	1975	-	-
1180	DECANOL	ALFOL	1	OXIDATION HYDROLYSIS		1	-	-	25	1979
		MODIFIED ZIEGLER	1	CONDENSATION HYDROGENATION		1	-	-	16	1979
		OXO PROCESS	1	HYDROFORMULATION REDUCTION		1	-	-	-	19 -
1190	DIACETONE ALCOHOL	ACETONE CONDENSATION	1	CONDENSATION		4	57	1977	-	-
1216	O-DICHLOROBENZENE	CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	1			7	-	-	138	1979
1220	P-DICHLOROBENZENE	CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	1	CHLORINATION NEUTRALIZATION	X X	7	37	1976	168	1979
1221	DICHLORODIFLUOROMETHANE	CCL4 HYDROFLUORINATION	1	HYDROFLUORINTATION	X X X X X	10	351	1978	-	-
1244	DICHLOROETHANE (EDC)	ETHYLENE CHLORINATION	1	CHLORINATION OXYCHLORINATION	X X X X	19	9950	1976	-	-
1250	DICHLOROHYDRIN	CO-PRODUCT OF OCPDB NO. 2091	2			2	-	-	-	-
1270	DICHLOROPROPENE	CO-PRODUCT OF OCPDB NO. 210	1			3	-	-	-	-
1280	DICYCLOHEXYLAMINE	ANILINE HYDROGENATION	2	HYDROGENATION		2	-	-	-	-
1290	DIETHYLAMINE	CO-PRODUCT OF OCPDB NO. 1700	1			5	14	1976	-	-
1300	DIETHYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 1830	1			16	276	1976	472	1978
1310	DIETHYLENE GLYCOL MONOBUTYL ETHER	ETHYLENE OXIDE AND BUTANOL	1	ALCOHOLYSIS	X	4	25	1975	-	-
1320	DIETHYLENE GLYCOL MONOBUTYL ETHER ACETATE	DEG BUTYL ETHER ESTERIFICATION	2	ESTERIFICATION		2	-	-	-	-
1330	DIETHYLENE GLYCOL MONOETHYL ETHER	ETHYLENE OXIDE AND ETHANOL	1	ALCOHOLYSIS	X	4	28	1975	-	-
1340	DIETHYLENE GLYCOL ETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	ESTERIFICATION		1	16	1975	-	-
1360	DIETHYLENE GLYCOL MONO METHYL ETHER	ETHYLENE OXIDE AND METHANOL	1	ALCOHOLYSIS	X	6	12	1975	-	-
1420	DIETHYL SULFATE	ETHYLENE AND SULFURIC ACID	2	SULFONATION		1	6	1976	11	1978
1430	DIFLUOROETHANE	ACETYLENE AND HYDROGEN FLUORIDE	2	HYDROFLUORINATION	X X X X X	2	-	-	-	-
1440	DIISOBUTYLENE	ISOBUTYLENE	2	ALKYLATION		3	-	-	-	-
1450	DIKETENE	DIMERIZATION OF KETENE	2	DIMERIZATION		2	-	-	-	-
1460	DIMETHYLAMINE	CO-PRODUCT OF OCPDB NO. 2530	1			5	176	1974	-	-
1480	DIMETHYL ETHER	METHANOL AND SULFURIC ACID	2	CONDENSATION		1	-	-	-	-
1490	DIMETHYL FORMAMIDE	DIMETHYAMINE AND CO	2	AMMONOLYSIS		1	150	1976	-	-
		METHYL FORMATE AND DIMETHYLAMINE	2	CARBONYLATION		2	41	1976	-	-

(CONTINUED)

Table A-3. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS																NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
					DISTILLATION	ABSORPTION	EXTRACTION	EVAPORATION	CRYSTALLIZATION	DRYING	SEPARATION	MIXING	FUSION	OXIDATION	NEUTRALIZATION	HYDROGENATION	ESTERIFICATION	DEHYDRATION	HYDROLYSIS	ACIDIFICATION					
1495	DIMETHYL HYDRAZINE	DIMETHYLAMINE	2	AMMONOLYSIS HYDRATION																	1	4	1975	-	-
1500	DIMETHYL SULFATE	DIMETHYL ETHER AND SO3	1	SULFONATION																	2	-	-	-	-
1510	DIMETHYL SULFIDE	METHANOL AND HYDROGEN SULFIDE	2	SULFONATION																	3	-	-	-	-
1520	DIMETHYL SULFOXIDE	DIMETHYL SULFIDE OXIDATION	1	OXIDATION																	2	-	-	-	-
1530	DIMETHYL TEREPHTHALATE	P-XYLENE OXIDAITON	1	NEUTRALIZATION OXIDATION ESTERIFICATION		X	X			X	X										5	2800	1976	4160	1977
1550	DINITROTOLUENE	TOLUENE NITRATION	1	NITRATION		X	X		X						X						5	272	1975	-	-
1570	DIOXOLANE	ETHYLENE GLYCOL	2	CONDENSATION DEHYDRATION																	1	-	-	-	-
1590	DIPHENYL OXIDE	CHLOROBENZENE/PHENOL/NAOH CONDENSATION	1	HYDROLYSIS ACIDIFICATION																	2	30	1976	-	-
1610	DIPROPYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 3111	1																		6	52	1977	71	1978
1620	DODECENE	PROPYLENE POLYMERIZATION	2	POLYMERIZATION																	9	-	-	475	1979
1640	DODECYLPHENOL	PHENOL ALKYLATION	2	ALKYLATION																	4	-	-	-	-
1650	EPICHLOROHYDRIN	ALLYL CHLORIDE	1	CHLOROHYDRINATION		X															3	296	1977	480	1979
1660	ETHANOL	ETHYLENE HYDRATION	1	NEUTRALIZATION HYDRATION		X	X	X					X								6	-	-	2110	1979
1661	ETHANOLAMINES	ETHYLENE OXIDE AMMONOLYSIS	1	AMMONOLYSIS		X	X														4	-	-	460	1979
1670	ETHYL ACETATE	ACETALDHYDE	1	ESTERIFICATION		X		X					X	X							3	-	-	90	1979
		POLYVINYL ACETAL	2	UNSPECIFIED		X		X					X	X							1	-	-	30	1979
		CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	1																		2	-	-	150	1979
1680	ETHYL ACETOACETATE	DIKETENE AND ETHANOL	2	ESTERIFICATION																	4	-	-	-	-
1690	ETHYL ACRYLATE	MODIFIED REPP	1	CARBONYLATION ESTERIFICATION																	1	65	1977	-	-
		ETHANOL AND ACRYLIC ACID	1	ESTERIFICATION		X			X												4	195	1977	-	-
1700	ETHYLAMINE	ETHANOL AMMONOLYSIS	1	AMMONOLYSIS		X															5	51	1976	-	-
1710	ETHYLBENZENE	BENZENE ALKYLATION	1	ALKYLATION		X															10	7660	1978	9120	1978
1720	ETHYL BROMIDE	ETHYLENE AND HYDROGEN BROMIDE	1	HYDROBROMINATION																	2	3	1978	-	-
1740	ETHYL CHLORIDE	ETHYLENE HYDROCHLORINATION	1	HYDROCHLORINATION		X	X														6	-	-	765	1979
1770	ETHYLENE	REFINERY GASES	1	PYROLYSIS		X	X		X				X								4	2025	1976	-	-
		NATURAL GAS LIQUIDS	1	PYROLYSIS		X	X		X				X								27	-	19 -	-	-
		HEAVY LIQUIDS	1	PYROLYSIS		X	X		X				X								10	5625	1976	-	-
1780	ETHYLENE CARBONATE	ETHYLENE OXIDE AND CO2	2	CONDENSATION																	1	-	-	-	-
1790	ETHYLENE CHLOROHYDRIN	ETHYLENE AND HYPOCHLOROUS ACID	2	CHLOROHYDRINATION																	1	-	-	-	-
1800	ETHYLENE DIAMINE	ETHYLENE DICHLORIDE AND NH3	1	AMMONOLYSIS		X															4	-	-	164	1979
1810	ETHYLENE DIBROMIDE	ETHYLENE BROMINATION	1	BROMINATION		X	X														4	201	1976	-	-
1830	ETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION	1	HYDRATION		X		X	X												11	3470	1977	4505	1979
1840	ETHYLENE GLYCOL DIACETATE	ETHYLENE GLYCOL ESTERIFICATION	1	ESTERIFICATION																	2	20	1979	-	-
1890	ETHYLENE GLYCOL MONOBUTYL ETHER	ETHYLENE OXIDE AND N-BUTANOL	1	ALCOHOLYSIS		X															9	170	1977	-	-
1900	ETHYLENE GLY. MONOBUTYL ETHER ACETATE	ESTERIFICATION WITH A.A.	2	ESTERIFICATION																	1	12	1977	-	-
1910	ETHYLENE GLYCOL MONOETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890	1																		9	233	1978	-	-
1920	ETHYLENE GLY. MONOETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	ESTERIFICATION		X															1	103	1977	-	-
1930	ETHYLENE GLYCOL MONOMETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890	1																		9	113	1977	-	-
1940	ETHYLENE GLY. MONOMETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	ESTERIFICATION																	1	4	1977	-	-
1970	ETHYLENE GLYCOL MONOPROPYL ETHER	ETHYLENE OXIDE AND PROPANOL	2	ALCOHOLYSIS		X															1	-	-	-	-
1980	ETHYLENE OXIDE	ETHYLENE OXIDATION	1	OXIDATION		X	X														14	-	-	5525	1979
1990	ETHYL ETHER	ETHANOL DEHYDRATION	1	CONDENSATION DEHYDRATION		X	X														2	-	-	4	1979
2000	2-ETHYLHEXANOL	BY-PRODUCT OF OCPDB NO. 1660 PROCESS 1	1																		3	-	-	62	1979
		OXO PROCESS	1	HYDROFORMYLATION REDUCTION		X			X												5	492	1977	645	1979
2040	FORMALDEHYDE	METHANOL OXIDATION	1	OXIDATION		X	X	X								X	X				53	6063	1977	6702	1978
2060	FORMIC ACID	CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	1																		2	55	1979	75	1979
2070	FUMARIC ACID	MALEIC ACID ISOMERIZATION	1	ISOMERIZATION				X	X	X											3	-	-	50	1979

(CONTINUED)

Table A-3. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
2070	FUMARIC ACID	MALEIC ANHYDRIDE	1	HYDRATION ISOMERIZATION		1	-	-	25	1979
		BY-PRODUCT OF OCPDB NO. 2960 (ALL PR.)	1			1	-	-	5	1979
2073	FURFURAL	ACID HYDROLYSIS	1	CONDENSATION DEHYDRATION	X X X X	6	120	1978	216	1979
2090	GLYCEROL	EPICHLOROHYDRIN	1	HYDROLYSIS	X X X	2	65	1977	225	1979
		ALLYL ALCOHOL	1	HYDROLYSIS OXIDATION	X X X	1	30	1977	50	1979
		GLYCIDOL	1	HYDRATION		1	35	1977	40	1979
2091	GLYCEROL DICHLOROHYDRIN	ALLYLCHLORIDE CHLOROHYDRINATION	2	HYDROCHLORINATION		2	-	-	-	-
2120	GLYOXAL	OXIDATION OF ACETALDEHYDE	2	OXIDATION		2	36	1978	-	-
2160	HEXADECYL ALCOHOL	OXO PROCESS	1	HYDROFORMYLATION REDUCTION		1	-	-	22	1979
2165	HEXAMETHYLENEDIAMINE	HYDROGENATION OF ADIPONITRILE	1	HYDROGENATION	X	5	880	1977	1170	1977
		AMMONOLYSIS OF 1-6-HEXANEDIOL	2	AMMONOLYSIS		1	70	1977	85	1977
2170	HEXAMETHYLENEGLYCOL	REDUCTION OF DIETHYLADIPATE	2	REDUCITON		1	-	-	-	-
2180	HEXAMETHYLENE TETRAMINE	AMMONOLYSIS OF FORMALDEHYDE	2	AMMONOLYSIS CONDENSATION		6	70	1976	170	1977
2190	HYDROGEN CYANIDE	REACTION OF AMMONIA, AIR, AND METHANE	1	AMMOXIDATION	X X	9	-	-	1006	1979
		BY-PRODUCT OF OCPDB NO. 170	0			0	-	-	-	19 -
2200	HYDROQUINONE	CLEAVAGE OF DHP	1	OXIDATION CLEAVAGE		1	8	1978	10	1979
2240	ISOAMYLENE	DEHYDRATION OF ISOAMYL ALCOHOL	1	HYDRATION DEHYDRATION		1	-	-	-	-
2250	ISOBUTANOL	OXO	1	HYDROFORMYLATION REDUCTION	X X	7	175	1977	-	-
2261	ISOBUTYLENE	DEHYDRATION OF T-BUTANOL	1	DEHYDRATION		2	-	-	545	1979
		DEHYDRATION OF T-BUTANOL FROM BYSTREAM	1	HYDRATION DEHYDRATION		3	-	-	205	1979
2270	ISOBUTRALDEHYDE	OXO	1	HYDROFORMYLATION	X X	7	-	-	163	1979
2280	ISOBUTYRIC ACID	AIR OXIDATION OF ISOBUTRALDEHYDE	1	OXIDATION		1	-	-	-	-
2300	ISODECANOL	OXO FROM NONENE	1	HYDROFORMYLATION REDUCTION	X X X	3	-	-	-	-
2320	ISOOCTYL ALCOHOL	OXO FROM HEPTENE	1	HYDROFORMYLATION REDUCTION	X X	2	-	-	-	-
2330	ISOPHORONE	CONDENSATION OF ACETONE	2	CONDENSATION		3	-	-	-	-
2340	ISOPHTALIC ACID	AIR OXIDATION OF M-XYLENE	0	OXIDATION	X X X X	0	132	1977	240	1979
2350	ISOPRENE	DEHYDROGENATION OF ISOAMYLENE	1	DEHYDROGENATION	X X X	2	-	-	35	1979
2360	ISOPROPANOL	HYDROLYSIS OF PROPYL SULFATE	1	HYDROLYSIS	X X X X	4	-	-	2435	1979
		BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	0			0	-	-	-	19 -
2380	ISOPROPYL ALCOHOL	AMMONOLYSIS OF ISOPROPYL ALCOHOL	1	AMMONOLYSIS		4	-	-	-	-
		AMMONOLYSIS OF KETENE	2	AMMONOLYSIS		1	-	-	-	-
2390	ISOPROPYL CHLORIDE	HYDROCHLORINATION OF ISOPROPYL ALCOHOL	2	HYDROCHLORINATION		1	-	-	-	-
2410	KETENE	PYROLYSIS OF ACETIC ACID	2	PYROLYSIS		6	-	-	-	-
		UNSPECIFIED	2			2	-	-	-	-
2414	LINEAR ALKYL SULFONATE	SO3-AIR SULFONATION OF LAB	1	SULFONATION		20	-	-	508	1976
2417	LINEAR ALKYL BENZENE	BENZENE CHLORINATION/ALKYLATION	1	CHLORINATION ALKYLATION	X X X X X	4	-	-	424	1978
		BENZENE DEHYDROGENATION/ALKYLATION	1	DEHYDROGENATION ALKYLATION	X X X X X	1	-	-	224	1978
2430	MALEIC ANHYDRIDE	AIR OXIDATION OF BENZENE	1	OXIDATION	X	7	-	-	394	1979
		AIR OXIDATION OF BUTANE	1	OXIDATION	X	2	-	-	81	1979
2450	MESITYL OXIDE	DEHYDRATION OF DIACETONE ALCOHOL	2	DEHYDRATION		3	-	-	-	-
2460	METHACRYLIC ACID	ACETONE CYANOHYDRIN	1	HYDROLYSIS SULFONATION	X X X	3	-	-	-	-
2490	METHALLYL CHLORIDE	CHLORINATION OF ISOBUTYLENE	2	CHLORINATION		1	6	1978	-	-

(CONTINUED)

Table A-3. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
					DISTILLATION ABSORPTION EXTRACTION CRYSTALLIZATION DRYING SCREENING MIXING FILTRATION CENTRIFUGATION OTHER					
2500	METHANOL	REFORMING NATURAL GAS	1	STEAM REFORMING	X X	11	6459	1977	8245	1977
2520	METHYL ACETOACETATE	BY-PRODUCT OF OCPDB NO. 2410 PROCESS 1	0			0	-	-	-	-
2530	METHYLAMINE	AMMONOLYSIS OF METHANOL	1	AMMONOLYSIS	X X X	15	200	1974	323	1978
2540	N-METHYLANILINE	REACTION OF ANILINE AND METHANOL	2	CONDENSATION		2	-	-	-	-
2545	METHYL BROMIDE	HYDROBROMINATION OF METHANOL	1	HYDROBROMINATION	X X X	3	37	1977	48	1977
2560	METHYL CHLORIDE	METHANOL HYDRO-CHLORINATION	1	HYDROCHLORINATION	X X	13	-	-	285	1977
		METHANE CHLORINATION	1	CHLORINATION		3	-	-	32	1977
2570	METHYL CYCLOHEXANE	REDUCTION OF TOLUENE	1	HYDROGENATION		1	-	-	-	-
2590	METHYLCYCLOHEXANONE	OXIDATION OF METHYL CYCLOHEXANOL	2	OXIDATION		1	-	-	-	-
2620	METHYLENE CHLORIDE	METHYL CHLORIDE CHLORINATION	1	CHLORINATION	X X	3	-	-	285	1977
		CO-PRODUCT OF OCPDB NO. 2560 PROCESS 2	0			0	-	-	91	1977
2630	METHYLENE DIANILINE	CONDENSATION OF ANILINE AND FORMALDEHYDE	2	CONDENSATION AMMONOLYSIS	X X	3	122	1978	-	-
2635	METHYLENE DIPHENYL DIISOCYANATE	PHOSGENATION OF DIPHENYLMETHANE AMINE	1	PHOSGENATION		4	400	1978	560	1978
2640	METHYLETHYL KETONE	DEHYDROGENATION OF SEC-BUTANOL	1	DEHYDROGENATION	X X X	5	-	-	695	1979
2650	METHYLISOBUTYLCARBINOL	MIBK HYDROGENATION	1	DEHYDRATION		2	48	1977	-	-
2660	METHYLISOBUTYL KETONE	MESITYLOXIDE HYDROGENATION	1		X X X	20	148	1977	231	1979
2665	METHYL METHACRYLATE	ACETONE CYANOHYDRIN	1	SULFONATION HYDROLYSIS ESTERIFICATION		4	816	1978	1125	1978
2690	ALPHA-METHYLSTYRENE	DEHYDROGENATION OF CUMENE	1	DEHYDROGENATION	X	1	-	-	29	1979
		BY-PRODUCT OF OCPDB NO. 2910 PROCESS 1	0			0	-	-	52	1979
2700	MORPHOLINE	DEHYDRATION OF DIETHANOLAMINE	2	DEHYDRATION NEUTRALIZATION		1	-	-	28	1979
2756	O-NITROANILINE	AMMONOLYSIS OF CHLORONITROBENZENE	1	AMMONOLYSIS		1	-	-	-	-
2757	P-NITROANILINE	CO-PRODUCT OF OCPDB NO. 2756 PROCESS 1	0			0	-	-	10	1979
2770	NITROBENZENE	NITRATION OF BENZENE	1	NITRATION	X X X X	7	552	1977	1575	1979
2790	NITROETHANE	NITRATION OF PROPANE	1	NITRATION		1	-	-	-	-
2791	NITROMETHANE	CO-PRODUCT OF OCPDB NO. 2790	0			0	-	-	-	-
2795	NITROPROPANE	CO-PRODUCT OF OCPDB NO. 2790	0			0	-	-	-	-
2800	NITROTOLUENE	NITRATION OF TOLUENE	1	NITRATION		1	-	-	-	-
2810	NONENE	CO-PRODUCT OF OCPDB NO. 1620	0			0	-	-	531	1979
2820	NONYLPHENOL	ALKYLATION OF PHENOL	1	ALKYLATION	X X	8	176	1979	271	1979
2850	PENTAERYTHRITOL	FORMALDEHYDE AND ACETALDEHYDE	1	CONDENSATION NEUTRALIZATION	X X X	1	43	1978	75	1978
2860	PERCHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 810 PROCESS 3	0			0	-	-	590	1979
		ETHYLENE DICHLORIDE OXYCHLORINATION	1	OXYCHLORINATION	X X X X	1	-	-	200	1979
		ETHYLENE DICHLORIDE CHLORINATION	1	CHLORINATION	X X X X	3	-	-	365	1979
2910	PHENOL	CUMENE HYDRO-PEROXIDE CLEAVAGE	1	CLEAVAGE	X X	11	-	-	3288	1979
		TOLUENE	1	OXIDATION DECARBOXYLATION		1	-	-	75	1979
2950	PHOSGENE	CHLORINATION OF CARBON MONOXIDE	1	CHLORINATION		18	-	-	1890	1979
2960	PHTHALIC ANHYDRIDE	BASF	1	OXIDATION	X X X	4	459	1978	665	1979
		VON HEYDEN	1	OXIDATION	X X X	4	239	1978	346	1979
		SHERWIN WILLIAMS/BADGER	1	OXIDATION	X X X	2	211	1978	290	1979
		OXIDATION OF NAPTHALENE	1	OXIDATION	X X X X	1	66	1978	90	1979
2973	BETA-PICOLINE	ACETALDEHYDE + HCHO AND METHANOL	2	AMMOXIDATION CONDENSATION		1	-	-	60	1979
2976	PIPERAZINE	AMMONOLYSIS OF ETHANOLAMINES	2	AMMONOLYSIS CONDENSATION DEHYDRATION		2	5	1974	-	-
3000	POLYBUTENES	FRIEDEL CRAFTS POLYMERIZATION	1	POLYMERIZATION		6	450	1976	545	1979
3010	POLYETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION/POLYMERIZATION	1	HYDRATION POLYMERIZATION		8	64	1976	-	-
3025	POLYPROPYLENE GLYCOL	POLY.OF PROPYLENE OX. AND PROPYLENE GLY.	2	POLYMERIZATION		9	38	1976	-	-
3063	PROPIONALDEHYDE	OXO	1	HYDROFORMYLATION		2	195	1974	-	-

(CONTINUED)

Table A-3. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS	NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
3066	PROPIONIC ACID	OXO	1	HYDROFORMYLATION		2	-	-	220	1979
		BY-PRODUCT OF OCPDB NO. 70 PROCESS 4	0			0	-	-	-	19 -
3070	N-PROPYL ALCOHOL	OXO	1	HYDROFORMYLATION	X X	1	-	-	-	-
				REDUCTION						
		OXIDATION OF PROPANE	1	OXIDATION		1	-	-	-	-
3075	PROPYLAMINE	NH3 + ALCOHOL, DEHYDRATION CATALYST	2	AMMONOLYSIS	X	1	-	-	-	-
				DEHYDRATION						
		NH3 + ALCOHOL + H2, DEHYDRATION CATALYST	2	AMMONOLYSIS	X	1	-	-	-	-
				DEHYDRATION						
		NH3+ALDEHYDE+H2, HYDROGENATION CATALYST	2	AMMONOLYSIS	X	1	-	-	-	-
				HYDROGENATION						
3080	PROPYL CHLORIDE	HYDROCHLORINATION OF PROPYL ALCOHOL	2	HYDROCHLORINATION		1	-	-	-	-
3090	PROPYLENE	BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			0	7060	1977	8175	1979
3110	PROPYLENE DICHLORIDE	BY-PRODUCT OF OCPDB NO. 3100	0			0	84	1975	-	-
3120	PROPYLENE OXIDE	PROPYLENE CHLOROHYDRIN + BASE	1	HYDROLYSIS	X X X	5	1125	1979	1645	1979
		ISOBUTANE PEROXIDATION	1	PEROXIDATION		1	900	1979	920	1979
		CO-PRODUCT OF OCPDB NO. 3230 PROCESS 2	0			0	312	1979	400	1979
3130	PYRIDINE	CO-PRODUCT OF OCPDB NO. 2973 PROCESS 1	0			0	-	-	-	-
3140	QUINONE	OXIDATION OF ANILINE	2	OXIDATION		1	-	-	-	-
2190	SODIUM CARBOXYMETHYL CELLULOSE	CELLULOSE	1	ETHERIFICATION		3	59	1976	85	1979
				ACIDIFICATION						
3200	SODIUM FORMATE	CARBONMONOXIDE + SODIUM HYDROXIDE	1	CONDENSATION		4	33	1975	-	-
3220	SORBIC ACID	OXIDATION OF 2,4-HEXADIENAL	2	OXIDATION		1	-	-	-	-
3230	STYRENE	DEHYDROGENATION OF ETHYL BENZENE	1	DEHYDROGENATION	X X	0	5610	1977	7790	1977
		ETHYL BENZENE HYDROPEROXIDE + PROPYLENE	1	PEROXIDATION		1	720	1977	1000	1977
				DEHYDRATION						
3260	SULFOLANE	ADDITION OF SO2 TO BUTADIENE	2	CONDENSATION		2	35	1972	-	-
				HYDROGENATION						
3280	TEREPHTHALIC ACID	OXIDATION OF P-XYLENE	1	OXIDATION		3	1162	1976	3100	1978
		HYDROLYSIS OF DMT	1	HYDROLYSIS		1	138	1976	250	1978
3310	TETRAETHYL LEAD	ALKYLATION OF LEAD	1	ALKYLATION	X X X X	1	62	-	170	-
3320	TETRAHYDRONAPTHALENE	HYDROGENATION OF NAPTHALENE	2	HYDROGENATION		2	75	1979	-	-
3335	TETRAMETHYL LEAD	MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR1	0			0	-	-	-	-
3349	TOLUENE	BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			0	1014	1978	1027	1979
3355	TOLUENE DIISOCYANATES (MIXTURE)	MULTIPLE PRODUCT WITH OCPDB NO. 3354	0			0	-	-	-	-
2380	TOLUENE SULFONYL CHLORIDE	TOLUENE AND CHLOROSULFONIC ACID	1	SULFONATION		1	-	-	-	-
				CHLORINATION						
3381	TOLUIDINES	HYDROGENATION OF NITROTOLUENES	1	HYDROGENATION		2	-	-	-	-
3395	1,1,1-TRICHLOROETHANE	HYDROCHLORINATION OF VINYL CHLORIDE	1	HYDROCHLORINATION	X X	3	568	1978	1100	1979
		ETHANE CHLORINATION		CHLORINATION						
3400	1,1,2-TRICHLOROETHANE	CHLORINATION OF ETHYLENE DICHLORIDE	1	CHLORINATION		1	57	1978	65	1979
3410	TRICHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 2860 PROCESS 2	1	CHLORINATION		2	590	1974	-	-
		CO-PRODUCT OF OCPDB NO. 2860 PROCESS 3	0			0	-	-	200	1979
3411	TRICHLOROFLUOROMETHANE	CO-PRODUCT OF OCPDB NO. 1221	0			0	-	-	195	1979
3420	1,2,3 TRICHLOROPROPANE	CHLORINATION OF PROPYLENE	0			0	196	1978	-	-
			1	CHLORINATION		2	-	-	-	-
				DEHYDROHALOGENATION						
3430	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	HYDROFLUORINATION OF PERCHLOROETHYLENE	1	HYDROFLUORINATION	X X X X X	3	-	-	-	-
3450	TRIETHYLAMINE	CO-PRODUCT OF OCPDB NO. 1700	0			0	13	1978	-	-
3460	TRIETHYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 1830	0			0	88	1975	-	-
3480	TRIISOBUTYLENE	CO-PRODUCT OF OCPDB NO. 1440 PR 1 AND 2	0			0	-	-	-	-
3490	TRIMETHYLAMINE	CO-PRODUCT OF OPCDB NO. 2530	0			0	-	-	-	-
3500	UREA	ONCE THROUGH	1	AMMONOLYSIS	X X X X	14	839	1975	1360	1979
		PARTIAL SOLUTION RECYCLE	1	AMMONOLYSIS	X X X X	5	4195	1975	6806	1979
		TOTAL RECYCLE	1	AMMONOLYSIS	X X X X	26	7132	1975	-	19 -

(CONTINUED)

Table A-3. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	MAJOR UNIT PROCESSES	UNIT OPERATIONS												NUMBER OF SITES	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
					DISTILLATION	ABSORPTION	EXTRACTION	CRYSTALLIZATION	DRYING	MIXING	REACTION	SEPARATION	FLUIDIZATION	OTHER	INDUSTRIAL	DOMESTIC					
3510	VINYL ACETATE	ACETYLENE AND ACETIC ACID	1	ADDITION ESTERIFICATION	X												2	-	-	200	1979
		ETHYLENE AND ACETIC ACID	1	OXYACETALATION	X	X	X				X			X			5	-	-	2250	1979
3520	VINYL CHLORIDE	DEHYDROCHLORINATION OF EDC	1	DEHYDROCHLORINATION	X	X											13	6785	1978	7895	1979
		HYDROCHLORINATION OF ACETYLENE	1	HYDROCHLORINATION													1	258	1978	300	1979
3530	VINYLIDENE CHLORIDE	DEHYDROCHLORINATE 1,1,2-TRICHLOROETHANE	1	DEHYDROCHLORINATION													3	270	1978	-	-
3540	VINYL TOLUENE	TOLUENE + ETHYLENE	1	ALKYLATION DEHYDROGENATION													1	-	-	-	-
3541	XYLENES (MIXED)	NAPTHA	0	DEHYDROGENATION													0	432	1978	512	1979
3500	XYLENOL	BY-PRODUCT OF OCPDB NO. 1010 PROCESS 2	0														0	-	-	-	-

Table A-4. SOCMI Processes Operated Batchwise or Continuously

OCPDB Number	Chemical	Process	Batch Producers	
			Company	Location
400	Benzene sulfonic acid	Benzene sulfonation	Cove Lube, Inc. Jim Walker Resources	Danville, IL Birmingham, AL
530	Benzyl chloride	Toluene chlorination	UOP Stauffer Chemical	East Rutherford, NJ Edison, NJ
890	Chlorobenzene	Benzene chlorination	Allied Chemical	Syracuse, NY
1640	Dodecyl phenol	Phenol alkylation	GAF Corporation	Calvert City, KY
2757	p-Nitroaniline	Chloronitrobenzene ammonolysis	American Color UOP	Lock Haven, PA Shreveport, LA
2800	Nitrotoluene	Toluene nitration	First Mississippi	Pascagoula, MS
2820	Nonyl phenol	Phenol alkylation	Exxon GAF Corporation Rohm & Haas Uniroyal	Bayway, NJ Calvert City, KY Deer Park, TX Naugatuck, CT
2850	Pentaerythritol	Formaldehyde and acetaldehyde	Hercules IMC Perstorp	Louisiana, MO Seiple, PA Toledo, OH
3190	Sodium carboxy Methyl cellulose	Cellulose, caustic, and soldium chloroacetate	BASF H. Kohnstamm H. Kohnstamm MAK Chemical Buckey Cellulose	Wyandottle, MI Camden, NJ Clearing, IL Muncie, IN Memphis, TN
3310	Tetraethyl lead	Lead-sodium alloy alkylation	Du Pont Ethyl Ethyl PPG	Deepwater, NJ Baton Rouge, LA Pasadena, TX Beaumont, TX

Table A-5. SOCMI Processes with Both Batch and Continuous Operations

OCPDB Number	Chemical	Process	Continuous Operations	Batch Operations
180	Adipic acid	Cyclohexanol oxidation	Oxidation Distillation Absorbtion Washing Evaporation Mixing Crystallization Separation	Crystallization Drying Mixing Filtration
785	Caprolactam	Cyclohexanone oxidation	Oxidation Rearrangement Neutralization	Distillation Washing Extraction Crystallization Drying Mixing Separation Filtration
820	Cellulose acetate	Cellulose esterification	Precipitation Washing Drying	Pretreatment Acetylation Hydrolysis
2073	Furfural	Acid hydrolysis	Hydrolysis Dehydration Distillation	Extraction Separation
2430	Maleic anhydride	Benzene oxidation	Oxidation Scrubbing Separation	Distillation
2430	Maleic anhydride	Butane oxidation	Oxidation Evaporation Scrubbing Filtration	Distillation

Table A-6. SOCMI Agitator Useage Summary

OCPSD NO.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
20	ACETAL	ACETALDEHYDE AND ETHANOL	2	YES	NO	1	4	4	-	-	-	-
30	ACETALDEHYDE	ETHYLENE OXIDATION	1	YES	NO	3	5	15	-	-	1400	1978
		ETHANOL OXIDATION	1	NO	YES	1	2	2	-	-	5	1978
		CO-PRODUCT OF OCPSD NO. 140	1			1	0	0	-	-	5	1979
40	ACETALDOL	ACETALDEHYDE SELF CONDENSATION	2	YES	NO	1	2	2	-	-	-	-
50	ACETAMIDE	ETHYL ACETATE AMMONOLYSIS	2	YES	UNK	2	2	4	1	1977	-	-
65	ACETANILIDE	ANILINE AND ACETIC ACID	2	YES	YES	2	4	8	2	1975	-	-
		ANILINE AND ACETYLCHLORIDE	2	YES	YES	2	4	8	1	1975	-	-
70	ACETIC ACID	METHANOL CARBONYLATION	1	NO	NO	3	0	0	-	-	1115	1977
		PERACETIC ACID AND ALLYL CHLORIDE	1	UNK	UNK	1	0	0	-	-	90	1977
		ACETALDEHYDE OXIDATION	1	NO	NO	3	0	0	-	-	1175	1979
		N-BUTANE OXIDATION	1	NO	NO	5	0	0	-	-	1190	1979
		ETHANOL FERMENTATION	0			1	0	0	-	-	80	1977
		BY-PRODUCT OF OCPSD NO. 2090 PROCESS 2	0			1	0	0	-	-	40	1977
		PAPER MILL WASTE STREAM	0			1	0	0	-	-	7	1977
80	ACETIC ANHYDRIDE	ACETIC ACID PYROLYSIS	1	NO	NO	3	0	0	-	-	1770	1977
90	ACETONE	CO-PRODUCT OF OCPSD NO. 2910 PROCESS 1	0			11	0	0	-	-	1972	1979
		ISOPROPANOL DEHYDRATION	1	NO	NO	5	0	0	-	-	890	1979
		ISOPROPANOL OXIDATION	1	NO	NO	1	0	0	-	-	100	1979
		BY-PRODUCT OF OCPSD NO. 2740	0			1	0	0	-	-	10	1979
		BY-PRODUCT OF OCPSD NO. 2200 PROCESS 1	0			1	0	0	-	-	10	1979
		BY-PRODUCT OF OCPSD NO. 3120 PROCESS 2	0			1	0	0	-	-	40	1979
100	ACETONE CYANOHYDRIN	ACETONE AND HCN	1	YES	NO	3	1	3	867	1978	1164	1978
110	ACETONITRILE	BY-PRODUCT OF OCPSD NO. 170	0			2	0	0	150	1973	-	-
		UNSPECIFIED	3			1	0	0	-	19 -	-	-
120	ACETOPHENONE	ETHYL BENZENE OXIDATION	2	YES	NO	2	2	4	1	1974	-	-
		CO-PRODUCT OF OCPSD NO. 2910 PROCESS 1	0			4	0	0	2	1974	-	-
125	ACETYL CHLORIDE	ACETIC ACID CHLORINATION	2	YES	NO	2	1	2	1	1979	-	-
130	ACETYLENE	METHANE PYROLYSIS	1	NO	NO	3	0	0	-	-	204	1979
		CO-PRODUCT OF OCPSD NO. 1770 (ALL PR.)	0			4	0	0	-	-	44	1979
		CALCIUM CARBIDE	0			2	0	0	-	-	50	1979
140	ACROLEIN	PROPYLENE OXIDATION	1	NO	NO	2	0	0	-	-	115	1978
150	ACRYLAMIDE	ACRYLONITRILE AND SULFURIC ACID	1	YES	YES	1	9	9	15	1977	30	1978
		CATALYTIC HYDRATION OF VCN	1	NO	NO	4	8	8	53	1977	110	1978
160	ACRYLIC ACID AND ESTERS	MODIFIED REPPE	1	YES	YES	1	2	2	-	-	58	1979
		PROPYLENE OXIDATION	1	NO	YES	4	1	4	-	-	1004	1979
170	ACRYLONITRILE	PROPYLENE AMMOXIDATION	1	NO	YES	6	5	30	-	-	2145	1979
180	ADIPIC ACID	CYCLOHEXANOL OXIDATION	1	NO	YES	5	14	70	-	-	1910	1979
185	ADIPONITRILE	ACRYLONITRILE ELECTROHYDRODIMERIZATION	3			1	0	0	-	-	150	1978
		BUTADIENE CHLORINATION	3			2	0	0	-	-	-	19 -
		CYCLOHEXANE	3			3	0	0	-	-	-	19 -
190	ALKYL NAPTHALENES	NO UNIT PROCESS	0			0	0	0	-	-	-	-
200	ALLYL ALCOHOL	PROPYLENE OXIDE ISOMERIZATION	1	NO	NO	1	0	0	-	-	-	-
		ALLYLCHLORIDE HYDROLYSIS	1	NO	NO	1	0	0	-	-	-	-
210	ALLYL CHLORIDE	PROPYLENE CHLORINATION	1	NO	NO	5	0	0	-	-	499	1979
220	AMINOBENZOIC ACID	NITROBENZOIC ACIDS	2	YES	NO	2	2	4	-	-	-	-
230	AMINOETHYLETHANOLAMINE	ETHYLENE OXIDE AND EDA	1	NO	NO	3	0	0	14	1974	-	-
235	P-AMINOPHENOL	NITROBENZENE/SULFURIC ACID	2	YES	UNK	1	2	2	-	-	-	-
		NITROPHENOL REDUCTION	2	YES	UNK	2	2	4	-	-	-	-
240	AMYL ACETATES	AMYL ALCOHOL ESTERIFICATION	2	UNK	UNK	2	0	0	12	1973	-	-
250	AMYL ALCOHOLS	OXO PROCESS	2	NO	YES	1	2	2	60	1978	-	-
		AMYLCHLORIDE HYDROLYSIS	2	NO	NO	5	0	0	-	19 -	-	-
260	AMYL AMINE	AMYL ALCOHOL AMMONOLYSIS	1	NO	NO	3	0	0	2	1976	-	-
270	AMYL CHLORIDE	PENTANE CHLORINATION	1	NO	NO	5	0	0	-	-	-	-
280	AMYL MERCAPTAN	AMYL CHLORIDE AND HYDROSULFIDE	2	YES	NO	2	2	4	-	-	-	-
290	AMYL PHENOL	PHENOL ALKYLATION	2	YES	YES	3	2	6	-	-	-	-
300	ANILINE	NITROBENZENE HYDROGENATION	1	NO	YES	7	4	28	-	-	1140	1979
310	ANILINE HYDROCHLORIDE	ANILINE AND HCL	2	UNK	UNK	1	0	0	-	-	-	-
320	ANISIDINE (S)	NITROANISOLE REDUCTION	2	YES	UNK	2	1	2	-	-	-	-
330	ANISOLE	PHENATE SALT ALKYLATION	2	YES	UNK	2	2	4	-	-	-	-

(CONTINUED)

Table A-6. (Continued)

XYID NO.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
340	ANTHRANILIC ACID	PHTHALIMIDE	2	YES	NO	1	2	2	1	1961	-	-
350	ANTHRAQUINONE	ANTHRACENE OXIDATION	1	NO	NO	1	0	0	4	1977	-	-
360	BENZALDEHYDE	BENZALCHLORIDE HYDROLYSIS	2	YES	NO	2	2	4	4	1978	-	-
		TOLUENE OXIDATION	2	NO	NO	3	0	0	5	1978	-	-
370	BENZAMIDE	BENZOYLCHLORIDE AND NH3	2	YES	UNK	2	2	4	-	-	-	-
380	BENZENE	PETROLEUM REFORMING	0			40	0	0	-	-	9900	1979
		COAL DERIVATIVE	0			12	0	0	-	-	1245	1979
		TOLUENE HYDRODEALKYLATION	1	NO	NO	15	0	0	-	-	4176	1979
		TOLUENE DISPROPORTIONATION	2	NO	NO	2	0	0	-	-	140	1979
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			0	0	0	-	-	2534	1979
390	BENZENE DISULFONIC ACIDS	BENZENE SULFONIC ACID	2	YES	NO	1	2	2	-	-	30	1979
400	BENZENE SULFONIC ACID	BENZENE SULFONATION	2	NO	YES	2	3	4	-	-	-	-
		BENZENE SULFONATION	2	YES	YES	2	3	6	-	-	-	-
410	BENZIL	BENZOIN OXIDATION	2	YES	YES	2	2	4	-	-	-	-
420	BENZILIC ACID	BENZIL REARRANGEMENT	2	YES	YES	1	3	3	-	-	-	-
430	BENZOIC ACID	TOLUENE OXIDATION	1	NO	YES	6	2	12	80	1976	281	1979
440	BENZOIN	BENZALDEHYDE	2	YES	UNK	2	2	4	-	-	-	-
450	BENZONITRILE	TOLUENE AMMOXIDATION	2	NO	NO	1	0	0	-	-	-	-
460	BENZOPHENONE	BENZENE AND CCL4	2	YES	NO	6	2	12	1	1976	-	-
480	BENZOTRICHLORIDE	BY-PRODUCT OF OCPDB NO. 530 PROCESS 1	0			1	0	0	10	1976	-	-
		BY-PRODUCT OF OCPDB NO. 530 PROCESS 1	0			3	0	0	41	1976	-	-
490	BENZOYL CHLORIDE	BENZOTRICHLORIDE	2	YES	NO	2	2	4	19	1974	-	-
500	BENZYL ALCOHOL	BENZYL CHLORIDE HYDROLYSIS	2	YES	NO	2	2	4	9	1976	-	-
510	BENZYL AMINE	BENZYL CHLORIDE AMMONOLYSIS	2	YES	UNK	2	2	4	-	-	-	-
520	BENZYL BENZOATE	BENZALDEHYDE	3			2	0	0	1	1974	-	-
		BENZOIC ACID AND BENZYL ALCOHOL	3			2	0	0	1	1974	-	-
530	BENZYL CHLORIDE	TOLUENE CHLORINATION	1	YES	NO	2	2	4	101	1978	140	1978
		TOLUENE CHLORINATION	1	YES	NO	5	4	8	9	1978	17	1978
540	BENZYL DICHLORIDE	CO-PRODUCT OF OCPDB NO. 530 PROCESS 1	0			2	0	0	40	1977	-	-
		CO-PRODUCT OF OCPDB NO. 530 PROCESS 2	0			2	0	0	4	1977	-	-
550	BIPHENYL	CO-PRODUCT OF OCPDB NO. 380 PROCESS 3	0			5	0	0	42	1976	-	-
		BENZENE DEHYDROGENATION	2	NO	NO	1	0	0	14	1976	-	-
560	BISPHENOL A	PHENOL/ACETONE	2	YES	YES	5	5	25	456	1977	910	1979
570	BROMOBENZENE	BENZENE BROMINATION	3			2	0	0	-	-	-	-
580	BROMONAPTHALENE	NAPTHALENE BROMINATION	2	YES	NO	2	2	4	-	-	-	-
590	BUTADIENE	N-BUTENE DEHYDROGENATION	1	NO	NO	4	0	0	-	-	1790	1979
		N-BUTANE (HOUDRY)	1	NO	NO	3	0	0	-	-	1040	1979
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			14	0	0	-	-	1470	1979
592	N-BUTENE	PETROLEUM REFINING	0			8	0	0	1755	1978	-	-
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			3	0	0	91	1978	-	-
		ALPHA-OLEFINS	1	NO	NO	1	0	0	6	1978	-	-
600	N-BUTYL ACETATE	BUTANOL ESTERIFICATION	2	YES	NO	3	8	24	-	-	170	1979
630	N-BUTYL ACRYLATE	MODIFIED KEPP	1	YES	YES	1	2	4	-	-	58	1978
		BUTANOL AND ACRYLIC ACID	1	NO	YES	4	1	4	247	1978	-	19 -
640	N-BUTYL ALCOHOL	OXO PROCESS	1	NO	YES	6	2	12	-	-	985	1979
		CROTONALDEHYDE HYDROGENATION	1	NO	NO	2	0	0	-	-	10	1979
650	S-BUTYL ALCOHOL	BUTENE HYDRATION	1	NO	NO	4	0	0	-	-	825	1979
660	T-BUTYL ALCOHOL	BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	0			1	0	0	-	-	664	1978
		ISOBUTYLENE	2	NO	NO	1	0	0	12	1978	-	19 -
670	N-BUTYLAMINE	BUTYRALDEHYDE	1	NO	NO	3	0	0	4	1976	-	-
680	S-BUTYLAMINE	BUTANOL AND AMMONIA	1	NO	NO	3	0	0	-	-	-	-
690	T-BUTYLAMINE	ISOBUTYLENE AND HCN	1	NO	NO	1	0	0	10	1978	-	-
700	P-T-BUTYL BENZOIC ACID	TOLUENE/ISOBUTYLENE OXIDATION	2	NO	YES	1	4	40	10	1978	-	-
710	1,3-BUTYLENE GLYCOL	ACETALDOL HYDROGENATION	3			3	0	0	39	1976	-	-
720	N-BUTYRALDEHYDE	OXO PROCESS	2	NO	YES	6	2	12	749	1976	-	-
760	BUTYRIC ACID	CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	0			1	0	0	-	-	-	-
		N-BUTYRALDEHYDE OXIDATION	3			2	0	0	21	1977	-	-
770	BUTYRIC ANHYDRIDE	BUTYRIC ACID AND KETENE	3			1	0	0	-	-	-	-
780	BUTYRONITRILE	PROPYL CHLORIDE AND HCN	3			1	0	0	-	-	-	-

(CONTINUED)

Table A-6. (Continued)

OCPSD No.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
705	CAPROLACTAM	CYCLOHEXANONE	1	YES	YES	3	16	48	700	1976	1125	1978
790	CARBON DISULFIDE	METHANE AND SULFUR	1	NO	NO	5	0	0	512	1977	850	1979
850	CARBON TETRABROMIDE	CCL4 AND HYDROGEN BROMIDE	2	YES	NO	4	1	4	-	-	-	-
810	CARBON TETRACHLORIDE	CARBON DISULFIDE CHLORINATION	1	YES	NO	1	4	12	-	-	500	1977
		METHANE CHLORINATION	1	NO	NO	5	0	0	-	-	317	1977
		HYDROCARBON CHLORINOLYSIS	1	NO	NO	3	0	0	-	-	716	1977
820	CELLULOSE ACETATE	CELLULOSE ESTERIFICATION	1	YES	YES	5	10	50	-	-	930	1976
840	CHLOROACETIC ACID	ACETIC ACID CHLORINATION	1	YES	YES	4	3	12	-	-	99	1979
850	O-CHLOROANILINE	CHLORONITROBENZENE	3			1	0	0	-	-	-	-
860	O-CHLOROANILINE	CHLOROACETANILIDE ACIDIFICATION	3			2	0	0	-	-	-	-
870	P-CHLOROANILINE	CO-PRODUCT OF OCPSD NO. 860	0			2	0	0	-	-	-	-
880	CHLOROBENZALDEHYDE	P-CHLORO TOLUENE	2	YES	NO	1	2	2	-	-	-	-
899	CHLOROBENZENE	BENZENE CHLORINATION	1	YES	NO	5	4	18	340	1978	680	1979
		BENZENE CHLORINATION	0			1	2	2	10	1978	20	1979
920	CHLOROBENZOIC ACID	CHLOROTOLUENE CHLORINATION/HYDROLYSIS	2	YES	UNK	2	2	4	-	-	-	-
925	CHLOROBENZOTRICHLORIDE	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
910	CHLOROBENZOYL CHLORIDE	CHLOROBENZOIC ACID	3			1	0	0	-	-	-	-
929	CHLORODIFLUOROETHANE	DIFLUOROETHANE CHLORINATION	3			2	0	0	-	-	-	-
921	CHLORODIFLUOROMETHANE	CHLOROFORM FLUORINATION	3			3	0	0	-	-	-	-
930	CHLOROFORM	CO-PRODUCT OF OCPSD NO. 810 PROCESS 2	0	YES	NO	8	1	8	200	1978	-	-
		METHYLCHLORIDE CHLORINATION	1	NO	NO	3	0	0	-	-	170	1979
940	CHLOROMALEIC ANHYDRIDE	NO U.S. PRODUCERS	0			6	0	0	-	-	345	1979
950	O-CHLORONITROBENZENE	CHLOROBENZENE NITRATION	3			0	0	0	-	-	-	-
951	P-CHLORONITROBENZENE	CO-PRODUCT OF OCPSD NO. 950	3			2	0	0	-	-	84	1979
960	CHLOROPHENOLS (O+P)	PHENOL CHLORINATION	3			5	0	0	140	1974	160	1979
964	CHLOROPRENE	BUTADIENE CHLORINATION	2	YES	NO	3	2	6	-	-	-	-
965	CHLOROSULFONIC ACID	NOT AN ORGANIC	0			3	2	6	405	1979	570	1979
970	M-CHLOROTOLUENE	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
980	O-CHLOROTOLUENE	TOLUENE CHLORINATION	2	YES	YES	1	3	3	-	-	-	-
990	P-CHLOROTOLUENE	CO-PRODUCT OF OCPSD NO. 980	0			1	0	0	-	-	-	-
992	CHLOROTRIFLUOROMETHANE	CHLOROFLUOROMETHANE PYROLYSIS	2	YES	NO	1	1	1	24	1975	-	-
1000	M-CRESOL	PETROLEUM EXTRACTANT	0			1	0	0	1	1978	-	-
		COAL TAR DISTILLATE	0			1	0	0	1	1978	-	-
1010	O-CRESOL	COAL OR PETROLEUM DERIVATIVE	0			5	0	0	25	1978	39	1978
		PHENOL METHYLATION	2			1	0	0	5	1978	8	1978
1020	P-CRESOL	TOLUENE SULFONATION	2	YES	YES	1	5	5	21	1978	-	-
1021	MIXED CRESOLS	PHENOL METHYLATION	3			2	0	0	10	1978	-	-
		PETROLEUM DERIVATIVES	0			4	0	0	22	1978	-	-
1030	CRESYLIC ACID	COAL TAR DERIVATIVE	0			2	0	0	-	-	60	1978
		PETROLEUM DERIVATIVE	0			6	0	0	-	-	220	1978
		CO-PRODUCT OF OCPSD NO. 1021 PROCESS 1	0			2	0	0	-	-	55	1978
1040	CROTONALDEHYDE	ACETALDEHYDE CONDENSATION	2	NO	NO	2	0	0	-	-	-	-
1050	CROTONIC ACID	CROTONALDEHYDE OXIDATION	2	YES	NO	2	2	2	5	1977	-	-
1515	CUMENE	BENZENE ALKYLATION	1	YES	YES	13	6	78	2770	1978	4940	1979
1079	CUMENE HYDROPEROXIDE	CUMENE OXIDATION	1	NO	NO	13	0	0	3200	1976	-	-
1160	CYANOACETIC ACID	SODIUM CHLOROACETATE	1	YES	NO	1	1	1	-	-	-	-
1090	CYANOGEN CHLORIDE	HCN CHLORINATION	1			1	0	0	-	-	-	-
1100	CYANURIC ACID	UREA PYROLYSIS	1			2	0	0	-	-	-	-
1110	CYANURIC CHLORIDE	CYANOGEN CHLORIDE	1	NO	NO	4	0	0	159	1977	-	-
1120	CYCLOHEXANE	BENZENE HYDROGENATION	1	NO	NO	10	0	0	-	-	2023	1979
		PETROLEUM DERIVATIVE	1			2	0	0	-	-	462	1979
1130	CYCLOHEXANOL	CYCLOHEXANE OXIDATION	1	YES	NO	6	5	30	-	-	2035	1979
		PHENOL HYDROGENATION	1	NO	NO	3	0	0	-	-	490	1979
1140	CYCLOHEXANONE	CO-PRODUCT OF OCPSD NO. 1130 PROCESS 1	0			6	0	0	-	-	2035	1979
		CO-PRODUCT OF OCPSD NO. 1130 PROCESS 2	0			2	0	0	-	-	490	1979
1150	CYCLOHEXENE	CYCLOHEXANOL DEHYDRATION	2			2	0	0	-	-	-	-
1160	CYCLOHEXYLAMINE	ANILINE HYDROGENATION	2	YES	NO	4	2	4	-	-	20	1979
1170	CYCLOOCTADIENE	BUTADIENE DIMERIZATION	2	NO	NO	1	0	0	20	1975	-	-
1189	DECANOL	ALFOL	1	NO	NO	1	0	0	-	-	25	1979
		MODIFIED ZIEGLER	1	NO	NO	1	0	0	-	-	16	1979

(CONTINUED)

Table A-6. (Continued)

SIC No.	Chemical	Process	Data Quality	Unit Process	Unit Operation	Number of Sites	Estimated Activations per Site	Estimated Total Activations	Production (million lb/yr)	Year	Capacity (million lb/yr)	Year
2869	Decanol	OXO PROCESS	1	NO	YES	1	1	1	-	-	-	19 -
2869	Diacetone alcohol	ACETONE CONDENSATION	2	NO	NO	4	0	0	57	1977	-	-
2869	Diaminobenzoic acid	Dinitrobenzoic acid	2	YES	UNK	1	2	2	-	-	-	-
2869	Dichlorobenzene	Dichlorobenzene/methane	2	YES	NO	3	5	15	44	1976	-	-
2869	4-Dichlorobiphenyl	DCB ISOMERIZATION	2	YES	NO	1	2	2	-	-	-	-
2869	0-Dichlorobiphenyl	CO-PRODUCT OCPSD NO. 896 PROCESS 1 OR 2	0			1	0	0	-	-	138	1979
2869	P-Dichlorobiphenyl	CO-PRODUCT OCPSD NO. 896 PROCESS 1 OR 2	1	NO	NO	1	0	0	32	1976	148	1979
2869	Dichlorodifluoromethane	CCL4 HYDROFLUORINATION	1	YES	NO	10	2	20	251	1978	-	-
2869	Dichloroethyl ether	Ethyl Ether chlorination	3			2	0	0	-	-	-	-
2869	Dichloroethylene (EDC)	Ethylene chlorination	1	NO	NO	19	0	0	9950	1976	-	-
2869	Dichlorohydrin	CO-PRODUCT OF OCPSD NO. 2091	0			2	0	0	-	-	-	-
2869	Dichlorophenol	CO-PRODUCT OF OCPSD NO. 210	0			3	0	0	-	-	-	-
2869	Dichloroaniline	ANILINE HYDROGENATION	2	NO	NO	2	0	0	-	-	-	-
2869	Diethanolamine	CO-PRODUCT OF OCPSD NO. 1700	0			3	0	0	14	1976	-	-
2869	Diethylene glycol	CO-PRODUCT OF OCPSD NO. 1830	0			14	0	0	276	1976	472	1978
2869	Diethylene glycol diethyl ether	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
2869	Diethylene glycol diethyl ether	DEG methyl ether and methyl chloride	2	YES	NO	20	2	4	-	-	-	-
2869	Diethylene glycol monobutyl ether	Ethylene oxide and butanol	3	NO	YES	4	2	8	25	1975	-	-
2869	Diethylene glycol monoethyl ether acetate	DEG BUTYL ETHER ESTERIFICATION	3	YES	NO	2	1	2	-	-	-	-
2869	Diethylene glycol monoethyl ether	Ethylene oxide and Ethanol	3	YES	NO	4	2	8	20	1975	-	-
2869	Diethylene glycol, ethyl, ether acetate	ACETIC ACID ESTERIFICATION	3	YES	NO	1	1	1	16	1975	-	-
2869	Diethylene glycol mono methyl ether	Ethylene oxide and methanol	2	YES	NO	4	2	12	12	1975	-	-
2869	Diethyl sulfate	Ethylene and sulfuric acid	3	NO	NO	1	0	0	6	1976	11	1978
2869	Difluoroethane	Acetylene and hydrogen fluoride	3	YES	NO	1	2	4	-	-	-	-
2869	Diisobutylene	Isobutylene	3	NO	NO	1	0	0	-	-	-	-
		Butylene extraction				1	0	0	-	-	-	-
2869	Diisooctyl Pathalate	Pathalic anhydride and isooctanol	3	YES	NO	10	1	4	14	19 2	2	-
2869	Diisooctyl Pathalate	Pathalic anhydride and isooctanol	3	YES	NO	10	1	4	4	19 7	7	-
2869	Diisopropanolamine	Dimerization of Oxirane	2	NO	NO	2	0	0	-	-	-	-
2869	Dimethylamine	CO-PRODUCT OF OCPSD NO. 2530	0			5	0	0	176	1976	-	-
2869	Dimethyl analine	Analine and methanol	3	YES	NO	3	3	9	14	1976	-	-
2869	Dimethyl Ether	Methanol and sulfuric acid	3	NO	NO	1	0	0	-	-	-	-
2869	Dimethylformamide	Dimethylamine and CO	3			1	0	0	130	1976	-	-
		Methyl formate and dimethylamine				1	0	0	41	1976	-	-
2869	Dimethylhydrazine	Dimethylamine	3			1	0	0	4	1975	-	-
2869	Dimethyl Sulfate	Dimethyl Ether and SO3	3	NO	NO	1	0	0	-	-	-	-
2869	Dimethyl Sulfide	Methanol and hydrogen sulfide	3			1	0	0	-	-	-	-
		Lignin Sometimes				1	2	2	-	-	-	-
2869	Dimethyl Sulfoxide	Dimethyl Sulfide oxidation	3	YES	NO	1	2	4	-	-	-	-
2869	Dimethyl Terephthalate	P-xylene oxidation	3	YES	NO	5	2	15	2800	1976	4160	1977
2869	3,5 Dinitrobenzoic acid	Benzoic acid nitration	3	YES	YES	1	2	2	-	-	-	-
2869	Dinitrotoluene	CO-PRODUCT OF OCPSD NO. 2792	0			3	0	0	1	1975	-	-
2869	Dinitrotoluene	Toluene nitration	0	YES	YES	5	7	35	272	1975	-	-
2869	Dioxane	Ethylene glycol	3	YES	NO	4	1	4	15	1976	-	-
2869	Dioxolane	Ethylene glycol	3	YES	NO	1	1	1	-	-	-	-
2869	Diphenylamine	Aniline condensation	3	YES	NO	3	1	3	40	1974	-	-
2869	Diphenyl Oxide	Chlorobenzene/phenol/NaOH condensation	3	NO	NO	3	1	3	30	1976	-	-
2869	Diphenyl Sulfonea	Aniline condensation	3	YES	YES	2	4	8	-	-	-	-
2869	Diphosphoric acid	CO-PRODUCT OF OCPSD NO. 3011	0			4	0	0	52	1977	71	1978
2869	Dipropylene	Propylene polymerization	3	NO	NO	9	0	0	-	-	475	1979
2869	Disulfoleic acid	Sulfuric acid	3			1	0	0	-	-	-	-
2869	Disulfolphenol	Phenol alkylation	3	YES	YES	4	3	12	-	-	-	-
		Phenol alkylation	3	YES	YES	1	4	4	-	-	-	-
2869	Epichlorohydrin	Allyl chloride	3	YES	NO	3	4	12	296	1977	480	1979
2869	Ethanol	Ethylene hydration	3	NO	NO	5	0	0	-	-	2110	1979
		Fermentation	3			5	0	0	-	-	550	1979
2869	Ethanolamines	Ethylene oxide ammonia	1	NO	NO	4	0	0	-	-	440	1979
2869	Ethyl acetate	Acetaldehyde	3			3	0	0	-	-	90	1979
		Polyvinyl acetate	3			2	0	0	-	-	230	1979
		CO-PRODUCT OF OCPSD NO. 70 PROCESS 4	0			3	0	0	-	-	150	1979
2869	Ethyl acetoacetate	Diketene and Ethanol	3			4	0	0	-	-	-	-

(CONTINUED)

Table A-6. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
1690	ETHYL ACRYLATE	MODIFIED REPP	1	YES	YES	1	2	2	65	1977	-	-
		ETHANOL AND ACRYLIC ACID	1	NO	YES	4	1	4	195	1977	-	-
1700	ETHYLAMINE	ETHANOL AMMONOLYSIS	2	NO	NO	5	0	0	51	1976	-	-
1710	ETHYLBENZENE	BENZENE ALKYLATION	1	YES	YES	10	1	14	7660	1978	9120	1978
		XYLENES DISTILLATION	0			4	0	0	255	1978	304	1978
1720	ETHYL BROMIDE	ETHYLENE AND HYDROGEN BROMIDE	2	NO	NO	2	0	0	3	1978	-	-
1730	ETHYL CELLULOSE	CELLULOSE AND CAUSTIC	1	YES	YES	3	4	12	11	1976	-	-
1740	ETHYL CHLORIDE	ETHYLENE HYDROCHLORINATION	1	YES	NO	6	1	6	-	-	765	1979
1750	ETHYL CHLOROACETATE	CHLOROACETIC ACID ESTERIFICATION	2	YES	NO	1	1	1	-	-	-	-
1760	ETHYL CYANOACETATE	CYANOACETIC ACID	2	YES	YES	2	2	4	-	-	-	-
1770	ETHYLENE	REFINERY GASES	1	NO	NO	4	0	0	2025	1976	-	-
		NATURAL GAS LIQUIDS	1	NO	NO	27	0	0	-	19 -	-	-
		HEAVY LIQUIDS	1	NO	NO	10	0	0	5625	1976	-	-
1780	ETHYLENE CARBONATE	ETHYLENE OXIDE AND CO2	2	NO	NO	1	0	0	-	-	-	-
1790	ETHYLENE CHLOROHYDRIN	ETHYLENE AND HYPOCHLOROUS ACID	2	NO	NO	1	0	0	-	-	-	-
1800	ETHYLENE DIAMINE	ETHYLENE DICHLORIDE AND NH3	2	YES	NO	4	1	4	-	-	164	1979
1810	ETHYLENE DIBROMIDE	ETHYLENE BROMINATION	2	NO	NO	4	0	0	201	1976	-	-
1830	ETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION	2	NO	NO	11	0	0	3470	1977	4505	1979
1840	ETHYLENE GLYCOL DIACETATE	ETHYLENE GLYCOL ESTERIFICATION	2	NO	NO	2	0	0	20	1979	-	-
1870	ETHYLENE GLYCOL DIMETHYL ETHER	EGDME AND METHYL CHLORIDE	2	YES	NO	1	2	4	1	1977	-	-
1890	ETHYLENE GLYCOL MONOBUTYL ETHER	ETHYLENE OXIDE AND N-BUTANOL	2	YES	NO	9	1	9	170	1977	-	-
1900	ETHYLENE GLY. MONOBUTYL ETHER ACETATE	ESTERIFICATION WITH A.A.	2	YES	NO	1	1	1	12	1977	-	-
1910	ETHYLENE GLYCOL MONOETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890	0			9	0	0	233	1978	-	-
1920	ETHYLENE GLY. MONOETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	YES	NO	1	1	1	103	1977	-	-
1930	ETHYLENE GLYCOL MONOMETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890	0			9	0	0	113	1977	-	-
1940	ETHYLENE GLY. MONOMETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	YES	NO	1	1	1	4	1977	-	-
1960	ETHYLENE GLYCOL MONOPHENYL ETHER	ETHYLENE OXIDE AND PHENOL	2	YES	NO	1	4	4	-	-	-	-
1970	ETHYLENE GLYCOL MONOPROPYL ETHER	ETHYLENE OXIDE AND PROPANOL	2	YES	NO	1	1	1	-	-	-	-
1980	ETHYLENE OXIDE	ETHYLENE OXIDATION	1	NO	NO	14	0	0	-	-	5525	1979
1990	ETHYL ETHER	ETHANOL DEHYDRATION	1	YES	NO	2	1	2	-	-	4	1979
		BY-PRODUCT OF OCPDB NO. 1660 PROCESS 1	0			3	0	0	-	-	62	1979
2000	2-ETHYLHEXANOL	OXO PROCESS	1	NO	YES	5	2	10	492	1977	645	1979
2010	ETHYL ORTHOFORMATE	HCN + ETHANOL + HCL	2	YES	NO	1	1	1	-	-	-	-
2020	ETHYL OXALATE	OXALIC ACID ESTERIFICATION	2			2	0	0	-	-	-	-
2030	ETHYL SODIUM OXALACETATE	ETHYL ACETATE	2			1	0	0	-	-	-	-
2040	FORMALDEHYDE	METHANOL OXIDATION	1	NO	NO	53	0	0	6063	1977	6702	1978
2050	FORMAMIDE	AMMONOLYSIS METHYL FORMATE	2	YES	NO	1	2	2	-	-	-	-
2060	FORMIC ACID	CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	0			2	0	0	55	1979	75	1979
2070	FUMARIC ACID	BY-PRODUCT OF OCPDB NO. 2440	0			0	0	0	-	-	6	1979
		MALEIC ACID ISOMERIZATION	1	YES	YES	3	3	10	-	-	50	1979
		MALEIC ANHYDRIDE	1	YES	YES	1	7	7	-	-	25	1979
2073	FURFURAL	BY-PRODUCT OF OCPDB NO. 2960 (ALL PR.)	0			1	0	0	-	-	5	1979
2090	GLYCEROL	ACID HYDROLYSIS	1	NO	NO	6	0	0	120	1978	216	1979
		EPICHLOROHYDRIN	1	YES	NO	5	1	5	65	1977	255	1979
		ALLYL ALCOHOL	1	YES	NO	1	1	1	30	1977	50	1979
		GLYCIDOL	1	YES	NO	1	1	1	35	1977	40	1979
2091	GLYCEROL DICHLOROHYDRIN	ALLYLCHLORIDE CHLOROHYDRINATION	2	YES	NO	2	1	2	-	-	-	-
2100	GLYCEROL HYDROXYISOPROPYL ETHER	GLYCEROL REACTED WITH PROPYLENE OXIDE	2			2	0	0	-	-	-	-
2110	GLYCINE	AMMONOLYSIS OF CHLOROACETIC ACID	1	YES	YES	3	4	12	-	-	-	-
2120	GLYOXAL	OXIDATION OF ACETALDEHYDE	2	YES	UNK	2	2	4	36	1978	-	-
2145	HEXACHLOROBENZENE	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
2150	HEXACHLOROETHANE	CHLORINATION OF PERCHLOROETHYLENE	2	YES	UNK	1	2	4	-	-	-	-
2160	HEXADECYL ALCOHOL	OXO PROCESS	2	NO	YES	1	2	2	-	-	22	1979
		REDUCTION OF ESTERS	3			4	0	0	-	-	-	19 -
2165	HEXAMETHYLENEDIAMINE	HYDROGENATION OF ADIPONITRILE	1	NO	YES	5	3	15	880	1977	1170	1977
		AMMONOLYSIS OF 1-6-HEXANEDIOL	3			1	0	0	70	1977	85	1977
2170	HEXAMETHYLENEGLYCOL	REDUCTION OF DIETHYLADIPATE	3			1	0	0	-	-	-	-
2180	HEXAMETHYLENE TETRAMINE	AMMONOLYSIS OF FORMALDEHYDE	2	YES	UNK	6	2	12	70	1976	170	1977
2190	HYDROGEN CYANIDE	REACTION OF AMMONIA, AIR, AND METHANE	1	NO	NO	9	0	0	-	-	1006	1979
		BY-PRODUCT OF OCPDB NO. 170	0			0	0	0	-	-	-	19 -
2200	HYDROQUINONE	REDUCTION OF QUINONE	1	YES	YES	1	44	44	17	1978	20	1979

(CONTINUED)

Table A-6. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
2200	HYDROQUINONE	CLEAVAGE OF DHP	1	YES	YES	1	8	8	8	1978	10	1979
2210	P-HYDROXYBENZOIC ACID	ACIDIFICATION OF THE ACID SALT	2	YES	UNK	2	8	16	-	-	-	-
2240	ISOAMYLENE	DEHYDRATION OF ISOAMYL ALCOHOL	2	NO	NO	1	0	0	-	-	-	-
2250	ISOBUTANOL	OXO	2	NO	YES	7	2	14	175	1977	-	-
2260	ISOBUTYL ACETATE	ESTERIFICATION OF ACETIC ACID	2	NO	NO	5	8	3	34	1962	-	-
2261	ISOBUTYLENE	DEHYDRATION OF T-BUTANOL	2	NO	NO	2	0	0	-	-	545	1979
		DEHYDRATION OF T-BUTANOL FROM BYSTREAM	1	NO	NO	3	0	0	-	-	205	1979
2270	ISOBUTRALDEHYDE	OXO	1	NO	YES	7	2	14	-	-	183	1979
2280	ISOBUTYRIC ACID	AIR OXIDATION OF ISOBUTRALDEHYDE	3			1	0	0	-	-	-	-
2300	ISODECANOL	OXO FROM NONENE	1	NO	YES	3	2	6	-	-	-	-
2320	ISOOCTYL ALCOHOL	OXO FROM HEPTENE	1	NO	YES	2	2	4	-	-	-	-
2321	ISOPENTANE	PETROLEUM DERIVATIVE	0			0	0	0	-	-	-	-
2330	ISOPHORONE	CONDENSATION OF ACETONE	2	NO	NO	3	0	0	-	-	-	-
2340	ISOPHTALIC ACID	AIR OXIDATION OF M-XYLENE	3			0	0	0	132	1977	240	1979
2350	ISOPRENE	DEHYDROGENATION OF ISOAMYLENE	1	NO	NO	2	0	0	-	-	35	1979
		PETROLEUM DERIVATIVE	0			0	0	0	-	-	-	19 -
2360	ISOPROPANOL	HYDROLYSIS OF PROPYL SULFATE	1	NO	NO	4	8	0	-	-	2435	1979
		BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	0			0	0	0	-	-	-	19 -
2370	ISOPROPYL ACETATE	ISOPROPANOL ESTERIFICATION	1	YES	UNK	2	7	4	-	-	55	1979
2380	ISOPROPYL ALCOHOL	AMMONOLYSIS OF ISOPROPYL ALCOHOL	3			4	0	0	-	-	-	-
		AMMONOLYSIS OF KETENE	3			1	0	0	-	-	-	-
2390	ISOPROPYL CHLORIDE	HYDROCHLORINATION OF ISOPROPYL ALCOHOL	2	NO	NO	1	0	0	-	-	-	-
2400	ISOPROPYL PHENOL	FRIEDEL CRAFTS	3			6	0	0	-	-	-	-
2410	KETENE	PYROLYSIS OF ACETIC ACID	1	NO	NO	6	0	0	-	-	-	-
		UNSPECIFIED	0			2	0	0	-	-	-	-
2414	LINEAR ALKYL SULFONATE	OLEUM SULFONATION OF LAB	1	YES	NO	37	1	37	-	-	838	1976
		SO3-AIR SULFONATION OF LAB	1	YES	NO	20	1	20	-	-	508	1976
2417	LINEAR ALKYL BENZENE	LIQUID SO3-SO2 SULFONATION OF LAB	1	YES	NO	4	2	8	-	-	70	1976
		BENZENE CHLORINATION/ALKYLATION	1	YES	YES	4	4	16	-	-	424	1978
		BENZENE DEHYDROGENATION/ALKYLATION	1	YES	NO	1	2	2	-	-	224	1978
2420	MALEIC ACID	BENZENE	3			2	0	0	-	-	-	-
2430	MALEIC ANHYDRIDE	AIR OXIDATION OF BENZENE	1	NO	NO	7	0	0	-	-	394	1979
		AIR OXIDATION OF BUTANE	1	NO	NO	2	0	0	-	-	81	1979
		BY-PRODUCT OF OCPDB NO. 2960 (ALL PR.)	0			0	0	0	-	-	10	1979
2440	MALIC ACID	MALEIC ACID HYDRATION	1	YES	YES	2	7	14	15	1978	-	-
2450	MESITYL OXIDE	DEHYDRATION OF DIACETONE ALCOHOL	3			3	0	0	-	-	-	-
2455	METANILIC ACID	REDUCTION OF BENZENE SULFONIC ACID	2	YES	UNK	3	3	9	-	-	-	-
2460	METHACRYLIC ACID	ACETONE CYANOHYDRIN	2	YES	NO	3	3	9	-	-	-	-
2490	METHALLYL CHLORIDE	CHLORINATION OF ISOBUTYLENE	2	NO	NO	1	0	0	6	1978	-	-
2500	METHANOL	REFORMING NATURAL GAS	1	NO	NO	11	0	0	6459	1977	8245	1977
2510	METHYL ACETATE	ESTERIFICATION OF METHANOL	2	YES	NO	8	2	16	15	1962	-	-
2520	METHYL ACETOACETATE	BY-PRODUCT OF OCPDB NO. 2410 PROCESS 1	0			0	0	0	-	-	-	-
2530	METHYLAMINE	AMMONOLYSIS OF METHANOL	1	NO	NO	15	0	0	200	1974	323	1978
2540	N-METHYLANILINE	REACTION OF ANILINE AND METHANOL	2	NO	UNK	2	0	0	-	-	-	-
2545	METHYL BROMIDE	HYDROBROMINATION OF METHANOL	2	NO	NO	3	0	0	37	1977	48	1977
2550	METHYL BUTYNOL	REACTION OF ACETYLENE WITH ACETONE	2	NO	UNK	1	0	0	-	-	-	-
2560	METHYL CHLORIDE	METHANOL HYDRO-CHLORINATION	1	NO	NO	13	0	0	-	-	205	1977
		METHANE CHLORINATION	1	NO	NO	3	0	0	-	-	32	1977
2570	METHYL CYCLOHEXANE	REDUCTION OF TOLUENE	1	NO	NO	1	0	0	-	-	-	-
2590	METHYLCYCLOHEXANONE	OXIDATION OF METHYL CYCLOHEXANOL	1	NO	NO	1	0	0	-	-	-	-
2620	METHYLENE CHLORIDE	METHYL CHLORIDE CHLORINATION	1	NO	NO	3	0	0	-	-	285	1977
		CO-PRODUCT OF OCPDB NO. 2560 PROCESS 2	0			0	0	0	-	-	91	1977
2630	METHYLENE DIANILINE	CONDENSATION OF ANILINE AND FORMALDEHYDE	2	YES	YES	3	4	12	122	1978	-	-
2635	METHYLENE DIPHENYL DIISOCYANATE	PHOSGENATION OF DIPHENYLMETHANE AMINE	2	YES	NO	4	2	8	400	1978	560	1978
2640	METHYLETHYL KETONE	DEHYDROGENATION OF SEC-BUTANOL	2	NO	UNK	5	1	5	-	-	695	1979
		BY-PRODUCT OF OCPDB NO. 70 PROCESS 4	0			0	0	0	-	-	175	1979
		PETROLEUM EXTRACTANT	0			0	0	0	-	-	-	19 -
2645	METHYL FORMATE	ESTERIFICATION OF FORMIC ACID	2	YES	NO	2	2	4	-	-	-	-
2650	METHYLISOBUTYLCARBINOL	MIBK HYDROGENATION	2	NO	NO	2	0	0	48	1977	-	-
2660	METHYLISOBUTYL KETONE	MESITYLOXIDE HYDROGENATION	0			20	0	0	148	1977	231	1979

(CONTINUED)

Table A-6. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
2665	METHYL METHACRYLATE	ACETONE CYANOHYDRIN	1	YES	YES	4	3	12	816	1978	1125	1978
2670	METHYL PENTYNOL	ACETYLENE AND 2-BUTANONE	3	UNK	UNK	2	0	0	1	1977	-	-
2690	ALPHA-METHYLSTYRENE	DEHYDROGENATION OF CUMENE	0			1	0	0	-	-	29	1979
2700	MORPHOLINE	BY-PRODUCT OF OCPDB NO. 2910 PROCESS 1	0			0	0	0	-	-	52	1979
2710	1-NAPTHALENE SULFONIC ACID	DEHYDRATION OF DIETHANOLAMINE	2	YES	UNK	1	4	4	-	-	28	1979
2720	2-NAPTHALENE SULFONIC ACID	SULFONATION OF NAPTHALENE	2	YES	UNK	2	3	6	5	1978	-	-
2730	ALPHA-NAPTHOL	SULFONATION OF NAPTHALENE	2	YES	YES	2	3	6	30	1978	-	-
2740	BETA-NAPTHOL	HYDROLYSIS OF NAPTHYLAMINE	2	YES	UNK	2	1	2	1	1964	-	-
2750	NEOPENTANOIC ACID	PEROXIDATION OF NAPTHALENE	3			1	0	0	37	1978	-	-
2756	O-NITROANILINE	CARBOXYLATION OF ISOBUTYLENE	2	NO	UNK	1	0	0	7	1978	-	-
		AMMONOLYSIS OF CHLOFONITROBENZENE	3			1	0	0	-	-	-	-
2757	P-NITROANILINE	AMMONOLYSIS OF CHLORONITROBENZENE	3			2	0	0	-	-	-	-
		CO-PRODUCT OF OCPDB NO. 2756 PROCESS 1	0			0	0	0	-	-	10	1979
2760	O-NITROANISOLE	CO-PRODUCT OF OCPDB NO. 2756 PROCESS 2	0			0	0	0	-	-	3	1979
2762	P-NITROANISOLE	ALKYLATION OF O-NITROPHENOL	2	YES	UNK	1	2	2	-	-	-	-
2770	NITROBENZENE	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
2780	NITROBENZOIC ACID	NITRATION OF BENZENE	1	YES	YES	7	5	35	552	1977	1575	1979
		NITRATION OF BENZOIL ACID	2	YES	YES	1	5	5	-	-	-	-
2790	NITROETHANE	OXIDATION OF NITROTOLUENE	2	YES	UNK	1	2	2	-	-	-	-
2791	NITROMETHANE	NITRATION OF PROPANE	1	NO	NO	1	0	0	-	-	-	-
2792	NITROPHENOL	CO-PRODUCT OF OCPDB NO. 2790	0			0	0	0	-	-	-	-
2795	NITROPROPANE	NITRATION OF PHENOL	2	YES	YES	3	6	12	-	-	-	-
2900	NITROTOLUENE	CO-PRODUCT OF OCPDB NO. 2790	0			0	0	0	-	-	-	-
		NITRATION OF TOLUENE	2	YES	YES	1	4	4	-	-	-	-
2910	NONENE	NITRATION OF TOLUENE	2	NO	YES	1	2	2	-	-	-	-
2920	NONYLPHENOL	CO-PRODUCT OF OCPDB NO. 1620	0			0	0	0	-	-	-	-
		ALKYLATION OF PHENOL	2	YES	YES	8	3	24	176	1979	271	1979
2930	OCTYL PHENOL	ALKYLATION OF PHENOL	2	YES	YES	4	4	16	21	1979	36	1979
2940	PARALDEHYDE	ACETALDEHYDE CONDENSATION	2	YES	YES	1	4	4	-	-	-	-
2650	PENTAERYTHRITOL	FORMALDEHYDE AND ACETALDEHYDE	2	YES	YES	1	4	4	-	-	-	-
		FORMALDEHYDE AND ACETALDEHYDE	2	YES	UNK	1	4	4	43	1978	75	1978
2851	N-PENTANE	PETROLEUM DERIVATIVE	2	YES	UNK	3	4	12	67	1978	117	1978
2855	1-PENTENE	PETROLEUM DERIVATIVE	0			0	0	0	-	-	-	-
2880	PERCHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 810 PROCESS 3	0			0	0	0	-	-	-	-
		ETHYLENE DICHLORIDE OXYCHLORINATION	1	NO	NO	1	0	0	-	-	590	1979
2682	PERCHLOROMETHYLMERCAPTAN	ETHYLENE DICHLORIDE CHLORINATION	1	NO	NO	3	0	0	-	-	300	1979
2890	O-PHENETIDINE	CLASSIFIED AS A PESTICIDE	0			0	0	0	-	-	365	1979
2900	P-PHENETIDINE	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
2910	PHENOL	REDUCTION OF P-NITROPHENOL	2	YES	UNK	3	2	6	-	-	-	-
		CUMENE HYDRO-PEROXIDE CLEAVAGE	2	YES	YES	11	4	44	-	-	3288	1979
		TOLUENE	2	NO	YES	1	2	2	-	-	75	1979
2920	PHENOLSULFONIC ACIDS	COAL TAR DERIVATIVE	0			0	0	0	-	-	-	19 -
2930	PHENYLANTHRANILIC ACID	SULFONATION OF PHENOL	2	YES	UNK	4	2	8	-	-	-	-
2940	PHENYLENEDIAMINE	ANILINE+O-CHLOROBENZOIC ACID	3			1	0	0	-	-	-	-
		AMMONOLYSIS OF O-DICHLOROBENZENE	2	YES	UNK	4	2	8	-	-	-	-
2950	PHOSGENE	REDUCTION OF NITRO-BENZENE	2	YES	UNK	5	2	10	-	-	-	-
2960	PHTHALIC ANHYDRIDE	CHLORINATION OF CARBON MONOXIDE	1	NO	NO	18	0	0	-	-	-	-
		BASF	1	NO	NO	4	0	0	459	1978	1890	1979
		VON HEYDEN	1	NO	NO	4	0	0	239	1978	665	1979
		SHERWIN WILLIAMS/BADGER	1	NO	NO	2	0	0	211	1978	346	1979
		OXIDATION OF NAPTHALENE	1	NO	NO	1	0	0	66	1978	290	1979
2970	PHTHALIMIDE	AMMONOLYSIS OF PHTHALIC ANHYDRIDE	3			1	0	0	30	1975	90	1979
2973	BETA-PICOLINE	ACETALDEHYDE + HCHO AND METHANOL	2	NO	NO	1	0	0	-	-	-	-
		COAL TAR DERIVATIVE	0			0	0	0	-	-	60	1979
2976	PIPERAZINE	AMMONOLYSIS OF ETHANOLAMINES	3			2	0	0	5	1974	-	19 -
3000	POLYBUTENES	FRIEDEL CRAFTS POLYMERIZATION	3			6	0	0	450	1976	545	1979
3010	POLYETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION/POLYMERIZATION	3			8	0	0	64	1976	-	-
3025	POLYPROPYLENE GLYCOL	POLY.OF PROPYLENE OX. AND PROPYLENE GLY.	3			9	0	0	38	1974	-	-
3063	PROPIONALDEHYDE	OXO	2	NO	YES	2	2	4	195	1976	-	-
3066	PROPIONIC ACID	OXO	2	NO	YES	2	2	4	-	-	220	1979
		BY-PRODUCT OF OCPDB NO. 70 PROCESS 4	0			0	0	0	-	-	-	19 -

(CONTINUED)

Table A-6. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
3070	N-PROPYL ALCOHOL	OXO	2	NO	YES	1	2	2	-	-	-	-
		OXIDATION OF PROPANE	2	NO	UNK	1	0	0	-	-	-	-
3075	PROPYLAMINE	NH3 + ALCOHOL, DEHYDRATION CATALYST	2	NO	NO	1	0	0	-	-	-	-
		NH3 + ALCOHOL + H2, DEHYDRATION CATALYST	2	NO	NO	1	0	0	-	-	-	-
		NH3+ALDEHYDE+H2, HYDROGENATION CATALYST	2	NO	NO	1	0	0	-	-	-	-
		HCN + OLEFIN	2	YES	YES	1	3	3	-	-	-	-
3080	PROPYL CHLORIDE	HYDROCHLORINATION OF PROPYL ALCOHOL	2	NO	NO	1	0	0	-	-	-	-
3090	PROPYLENE	BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			0	0	0	7060	1977	8175	1979
		REFINERY BY-PRODUCT	0			0	0	0	-	19 -	-	19 -
3100	PROPYLENE CHLOROHYDRIN	HYDROCHLORINATION OF PROPYLENE	2	YES	NO	1	2	2	-	-	-	-
3110	PROPYLENE DICHLORIDE	BY-PRODUCT OF OCPDB NO. 3100	0			0	0	0	84	1975	-	-
3111	PROPYLENE GLYCOL	HYDRATION OF PROPYLENE OXIDE	3			6	0	0	-	-	890	1979
3120	PROPYLENE OXIDE	PROPYLENE CHLOROHYDRIN + BASE	1	YES	NO	5	5	25	1125	1979	1645	1979
		ISOBUTANE PEROXIDATION	1	NO	NO	1	0	0	900	1979	920	1979
3130	PYRIDINE	CO-PRODUCT OF OCPDB NO. 3230 PROCESS 2	0			0	0	0	312	1979	400	1979
3140	QUINONE	CO-PRODUCT OF OCPDB NO. 2973 PROCESS 1	0			0	0	0	-	-	-	-
		OXIDATION OF ANILINE	3			1	0	0	-	-	-	-
3150	RESORCINOL	OXIDATION OF ANILINE	2	YES	UNK	1	2	2	-	-	-	-
3160	RESORCYLIC ACID	NEUTRAL. OF BENZENE DISULFONIC ACID	1	YES	YES	1	4	4	34	1974	40	1979
3170	SALICYLIC ACID	RESORCINOL	2	YES	YES	2	4	8	-	-	-	-
3180	SODIUM ACETATE	SODIUM PHENATE	1	YES	NO	4	8	32	44	1977	51	1979
3181	SODIUM BENZOATE	NEUTRALIZATION OF ACETIC ACID	2	YES	UNK	9	2	18	21	1979	53	1979
3190	SODIUM CARBOXYMETHYL CELLULOSE	NEUTRALIZATION OF BENZOIC ACID	2	YES	UNK	7	2	14	12	1975	-	-
		CELLULOSE	2	YES	YES	4	3	12	13	1976	18	1979
3191	SODIUM CHLOROACETATE	CELLULOSE	1	YES	NO	3	1	3	59	1976	85	1979
3200	SODIUM FORMATE	NEUTRALIZATION OF CHLOROACETIC ACID	2	YES	NO	1	2	2	-	-	-	-
3210	SODIUM PHENATE	CARBONMONOXIDE + SODIUM HYDROXIDE	1	NO	NO	4	0	0	33	1975	-	-
3220	SORBIC ACID	NEUTRALIZATION OF PHENOL	1	YES	NO	6	2	12	-	-	-	-
		OXIDATION OF 2,4-HEXADIENAL	3			1	0	0	-	-	-	-
3230	STYRENE	KETENE + CROTONALDEHYDE	3			2	0	0	-	-	-	-
		DEHYDROGENATION OF ETHYL BENZENE	1	NO	YES	0	1	10	5610	1977	7790	1977
3240	SUCCINIC ACID	ETHYL BENZENE HYDROPEROXIDE + PROPYLENE	1	YES	YES	1	5	0	720	1977	1000	1977
3250	SUCCINONITRILE	HYDROGENATION OF MALEIC ANHYDRIDE	1	YES	NO	3	2	6	-	-	-	-
3251	SULFANILIC ACID	REACTING ACRYLONITRILE WITH HCN	3			1	0	0	-	-	-	-
3260	SULFOLANE	SULFONATION OF ANILINE	2	YES	UNK	2	2	4	-	-	-	-
3270	TANNIC ACID	ADDITION OF SO2 TO BUTADIENE	2			0	0	0	35	1972	-	-
3280	TEREPHTHALIC ACID	EXTRACTION FROM NATURAL SOURCES	0			0	0	0	-	-	-	-
		OXIDATION OF P-XYLENE	1	YES	YES	3	7	21	1162	1976	3100	1978
3290	TETRACHLOROETHANES	HYDROLYSIS OF DMT	2	YES	YES	1	7	7	138	1976	250	1978
3300	TETACHLOROPHTHALIC ANHYDRIDE	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
3310	TETRAETHYL LEAD	CHLORINATION OF PHTHALIC ANHYDRIDE	2	YES	UNK	1	2	2	7	1977	-	-
		ALKYLATION OF LEAD	2	YES	NO	1	1	1	62	-	170	-
		ALKYLATION OF LEAD	1	YES	NO	4	2	8	235	1977	650	-
		GRIGNARD-ELECTROLYSIS	0			1	4	4	30	1977	80	-
3320	TETRAHYDRONAPTHALENE	HYDROGENATION OF NAPTHALENE	3			2	0	0	75	1979	-	-
3330	TETRAHYDROPHTHALIC ANHYDRIDE	BUTADIENE + MALEIC ANHYDRIDE	2	YES	UNK	1	2	2	3	1979	-	-
3335	TETRAMETHYL LEAD	MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR1	0			0	0	0	-	-	-	-
		MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR2	0			0	0	0	-	-	-	-
		MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR3	0			0	0	0	-	-	-	-
3340	TETRAMETHYLENEDIAMINE	NO U.S. PRODUCERS	0			0	0	0	-	-	-	-
3341	TETRAMETHYLETHYLENEDIAMINE	DICHLOROETHANE + DIMETHYLAMINE	3			0	0	0	-	-	-	-
3349	TOLUENE	CO-PRODUCT OF OCPDB NO. 380 PROCESS 1	0			4	0	0	-	-	-	-
		COAL TAR DERIVATIVE	0			0	0	0	7319	1978	9944	1978
		BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0			0	0	0	-	19 -	-	19 -
3350	TOLUENE 1,4, DIAMINE	HYDROGENATION OF DINITROTOLUENES	1	YES	YES	9	5	45	1014	1978	1027	1979
3354	TOLUENE 2,4, DIISOCYANATE	PHOSGENATION OF TOLUENEDIAMINE	1	YES	YES	9	5	45	-	-	750	1979
3355	TOLUENE DIISOCYANATES (MIXTURE)	MULTIPLE PRODUCT WITH OCPDB NO. 3354	0			0	0	0	600	1977	750	1979
3360	TOLUENE SULFONAMIDE	AMMONOLYSIS OF TOLUENE SULFONYL CHLORIDE	3			2	0	0	-	-	-	-
3370	TOLUENE SULFONIC ACIDS	TOLUENE SULFONATION	2	YES	UNK	7	1	7	20	1978	-	-
3380	TOLUENE SULFONYL CHLORIDE	TOLUENE AND CHLOROSULFONIC ACID	3			1	0	0	-	-	-	-
3381	TOLUIDINES	REDUCTION OF NITROTOLUENES	2	YES	UNK	2	2	4	-	-	-	-

(CONTINUED)

Table A-6. (Continued)

OPPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	UNIT PROCESS	UNIT OPERATION	NUMBER OF SITES	ESTIMATED AGITATORS PER SITE	ESTIMATED TOTAL AGITATORS	PRODUCTION (MILLION LB/YR)	YEAR	CAPACITY (MILLION LB/YR)	YEAR
3381	TOLUIDINES	HYDROGENATION OF NITROTOLUENES	2	NO	UNK	2	0	0	-	-	-	-
3390	TRICHLOROBENZENES	CHLORINATION OF DICHLOROBENZENE	2	YES	UNK	4	2	8	-	-	-	-
3395	1,1,1-TRICHLOROETHANE	HYDROCHLORINATION OF VINYL CHLORIDE	1	NO	NO	3	0	0	568	1978	1100	1979
		ETHANE CHLORINATION	1	NO	NO	1	0	0	57	1978	65	1979
3400	1,1,2-TRICHLOROETHANE	CHLORINATION OF ETHYLENE DICHLORIDE	1	NO	NO	2	0	0	590	1974	-	-
3410	TRICHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 2860 PROCESS 2	0			0	0	0	-	-	200	1979
		CO-PRODUCT OF OCPDB NO. 2860 PROCESS 3	0			0	0	0	-	-	195	1979
3411	TRICHLOROFLUOROMETHANE	CO-PRODUCT OF OCPDB NO. 1221	0			0	0	0	196	1978	-	-
34.0	1,2,3 TRICHLOROPROPANE	CHLORINATION OF PROPYLENE	2	NO	NO	2	0	0	-	-	-	-
3430	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	HYDROFLUORINATION OF PERCHLOROETHYLENE	2	YES	NO	3	1	3	-	-	-	-
3450	TRIETHYLAMINE	CO-PRODUCT OF OCPDB NO. 1700	0			0	0	0	13	1978	-	-
3460	TRIETHYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 1830	0			0	0	0	88	1975	-	-
3470	TRIETHYLENE GLYCOL DIMETHYL ETHER	TRIETHYLENE GLY. MONOETHER+METHYLCHLOR.	3			1	0	0	-	-	-	-
3480	TRIISOBUTYLENE	CO-PRODUCT OF OCPDB NO. 1440 PN 1 AND 2	0			0	0	0	-	-	-	-
3490	TRIMETHYLAMINE	CO-PRODUCT OF OPCDB NO. 2530	0			0	0	0	-	-	-	-
3500	UREA	ONCE THROUGH	1	NO	NO	14	0	0	839	1975	1360	1979
		PARTIAL SOLUTION RECYCLE	1	NO	NO	5	0	0	4195	1975	6806	1979
		TOTAL RECYCLE	1	NO	NO	26	0	0	7132	1975	-	19 -
3510	VINYL ACETATE	ACETYLENE AND ACETIC ACID	1	NO	YES	2	4	8	-	-	200	1979
		ETHYLENE AND ACETIC ACID	1	NO	YES	5	4	20	-	-	2250	1979
3520	VINYL CHLORIDE	DEHYDROCHLORINATION OF EDC	1	NO	YES	13	2	26	6785	1978	7895	1979
		HYDROCHLORINATION OF ACETYLENE	1	NO	YES	1	2	2	258	1978	300	1979
3530	VINYLIDENE CHLORIDE	DEHYDROCHLORINATE 1,1,2-TRICHLOROETHANE	1	NO	NO	3	0	0	270	1978	-	-
3540	VINYL TOLUENE	TOLUENE + ETHYLENE	2	NO	NO	1	0	0	-	-	-	-
3541	XYLENES (MIXED)	CO-PRODUCT OF OCPDB NO. 380 PROCESS 1	0			30	0	0	8020	1978	-	-
		NAPTHA	2	NO	NO	0	0	0	432	1978	512	1979
		COAL TAR DERIVATIVE	0			0	0	0	29	1978	33	1979
3560	O-XYLENE	BY-PRODUCT OF OCPDB NO. 3541 (ALL PR.)	0			0	0	0	-	-	-	-
3570	P-XYLENE	BY-PRODUCT OF OCPDB NO. 3541 (ALL PR.)	0			0	0	0	-	-	-	-
3580	XYLENOL	BY-PRODUCT OF OCPDB NO. 1010 PROCESS 2	0			0	0	0	-	-	-	-
3590	XYLIDINES	NITRATION OF MIXED XYLENE	2	YES	UNK	3	2	6	-	-	-	-

Table A-7. Potential Sources of VOC Contaminated Process Water in SOCMI

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES					PROCESS WATER DISPOSAL		
					CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
20	ACETAL	ACETALDEHYDE AND ETHANOL	3	1								
30	ACETALDEHYDE	ETHYLENE OXIDATION	1	3			X				X	
		ETHANOL OXIDATION	1	1		X					X	
		CO-PRODUCT OF OCPDB NO. 140	1	1								
40	ACETALNOL	ACETALDEHYDE SELF CONDENSATION	3	1								
50	ACETAMIDE	ETHYL ACETATE AMMONOLYSIS	2	2								
65	ACETANILIDE	ANILINE AND ACETIC ACID	3	2								
		ANILINE AND ACETYLCHLORIDE	3	2								
70	ACETIC ACID	METHANOL CARBONYLATION	1	3	X	X					X	
		PERACETIC ACID AND ALLYL CHLORIDE	3	1								
		ACETALDEHYDE OXIDATION	1	3	X	X					X	
		N-BUTANE OXIDATION	1	2					X		X	
		ETHANOL FERMENTATION	0	1								
		BY-PRODUCT OF OCPDB NO. 2090 PROCESS 2	0	1								
		PAPER MILL WASTE STREAM	0	1								
80	ACETIC ANHYDRIDE	ACETIC ACID PYROLYSIS	1	3	X	X					X	
90	ACETONE	CO-PRODUCT OF OCPDB NO. 2910 PROCESS 1	0	11								
		ISOPROPANOL DEHYDRATION	1	5		X					X	
		ISOPROPANOL OXIDATION	3	1								
		BY-PRODUCT OF OCPDB NO. 2740	0	1								
		BY-PRODUCT OF OCPDB NO. 2200 PROCESS 1	0	1								
		BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	0	1								
100	ACETONE CYANOHYDRIN	ACETONE AND HCN	1	3					X		X	
110	ACETONITRILE	BY-PRODUCT OF OCPDB NO. 170	0	2								
		UNSPECIFIED	3	1								
120	ACETOPHENONE	ETHYL BENZENE OXIDATION	3	2								
		CO-PRODUCT OF OCPDB NO. 2910 PROCESS 1	0	4								
125	ACETYL CHLORIDE	ACETIC ACID CHLORINATION	3	2								
130	ACETYLENE	METHANE PYROLYSIS	1	3					X		X	
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0	4								
		CALCIUM CARBIDE	0	2								
140	ACROLEIN	PROPYLENE OXIDATION	1	2				X			X	
150	ACRYLAMIDE	ACRYLONITRILE AND SULFURIC ACID	1	1					X			X
		CATALYTIC HYDRATION OF VCN	1	4								
160	ACRYLIC ACID AND ESTERS	MODIFIED REPPE	1	1	X						X	
		PROPYLENE OXIDATION	1	4	X						X	
170	ACRYLONITRILE	PROPYLENE AMMOXIDATION	1	6	X						X	
180	ADIPIC ACID	CYCLOHEXANOL OXIDATION	0	5	X						X	
185	ADIPONITRILE	ACRYLONITRILE ELECTROHYDRODIMERIZATION	3	1								
		BUTADIENE CHLORINATION	3	2								
190	ALKYL NAPTHALENES	CYCLOHEXANE	3	3								
200	ALLYL ALCOHOL	NO UNIT PROCESS	0	0								
		PROPYLENE OXIDE ISOMERIZATION	3	1								
210	ALLYL CHLORIDE	ALLYLCHLORIDE HYDROLYSIS	1	1		X					X	
220	AMINOBENZOIC ACID	PROPYLENE CHLORINATION	1	5								
230	AMINOETHYLETHANOLAMINE	NITROBENZOIC ACIDS	2	2								
235	P-AMINOPHENOL	ETHYLENE OXIDE AND EDA	2	3								
		NITROBENZENE/SULFURIC ACID	1	1								
240	AMYL ACETATES	NITROPHENOL REDUCTION	3	2								
250	AMYL ALCOHOLS	AMYL ALCOHOL ESTERIFICATION	1	2								
		OXO PROCESS	2	1	X							X
260	AMYL AMINE	AMYLCHLORIDE HYDROLYSIS	2	5					X		X	
270	AMYL CHLORIDE	AMYL ALCOHOL AMMONOLYSIS	1	3								
280	AMYL MERCAPTAN	PENTANE CHLORINATION	1	5								
290	AMYL PHENOL	AMYL CHLORIDE AND HYDROSULFIDE	3	1								
300	ANILINE	PHENOL ALKYLATION	2	3	X		X					X
310	ANILINE HYDROCHLORIDE	NITROBENZENE HYDROGENATION	1	7		X					X	
320	ANISIDINE (S)	ANILINE AND HCL	1	1								
		NITROANISOLE REDUCTION	3	2								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES					PROCESS WATER DISPOSAL		
					CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
330	ANISOLE	PHENATE SALT ALKYLATION	3	2								
340	ANTHRANILIC ACID	PHTHALIMIDE	3	1								
350	ANTHRAQUINONE	ANTHRACENE OXIDATION	1	1								
360	BENZALDEHYDE	BENZALCHLORIDE HYDROLYSIS	2	2								
		TOLUENE OXIDATION	2	3								
370	BENZAMIDE	BENZOYLCHLORIDE AND NH3	2	2			X					X
390	BENZENE	PETROLUEM REFORMING	0	40								
		COAL DERIVATIVE	0	12								
		TOLUENE HYDRODEALKYLATION	1	15	X	X					X	
		TOLUENE DISPROPORTIONATION	3	2								
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0	0								
390	BENZENE DISULFONIC ACIDS	BENZENE SULFONIC ACID	3	1								
400	BENZENE SULFONIC ACID	BENZENE SULFONATION	2	2		X						X
		BENZENE SULFONATION	2	2		X						X
410	BENZIL	BENZOIN OXIDATION	3	2								
420	BENZILIC ACID	BENZIL REARRANGEMENT	3	1								
430	BENZOIC ACID	TOLUENE OXIDATION	1	6					X			X
440	BENZOIN	BENZALDEHYDE	3	2								
450	BENZONITRILE	TOLUENE AMMOXIDATION	3	1								
460	BENZOPHENONE	BENZENE AND CCL4	0	6	X							X
480	BENZOTRICHLORIDE	BY-PRODUCT OF OCPDB NO. 530 PROCESS 1	0	1								
		BY-PRODUCT OF OCPDB NO. 530 PROCESS 1	0	3								
490	BENZOYL CHLORIDE	BENZOTRICHLORIDE	3	2								
500	BENZYL ALCOHOL	BENZYL CHLORIDE HYDROLYSIS	2	2								
510	BENZYL AMINE	BENZYL CHLORIDE AMMONOLYSIS	3	2								
520	BENZYL BENZOATE	BENZALDEHYDE	3	2								
		BENZOIC ACID AND BENZYL ALCOHOL	3	2								
530	BENZYL CHLORIDE	TOLUENE CHLORINATION	3	2								
		TOLUENE CHLORINATION	3	2								
540	BENZYL DICHLORIDE	CO-PRODUCT OF OCPDB NO. 530 PROCESS 1	0	2								
		CO-PRODUCT OF OCPDB NO. 530 PROCESS 2	0	2								
550	BIPHENYL	CO-PRODUCT OF OCPDB NO. 380 PROCESS 3	0	5								
		BENZENE DEHYDROGENATION	3	1								
560	BISPHENOL A	PHENOL/ACETONE	1	5	X		X	X	X		X	
570	BROMOBENZENE	BENZENE BROMINATION	3	2								
580	BROMONAPTHALENE	NAPTHALENE BROMINATION	0	2	X		X					X
590	BUTADIENE	N-BUTENE DEHYDROGENATION	1	4								
		N-BUTANE (HOUDRY)	1	3								
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0	14								
592	N-BUTENE	PETROLEUM REFINING	0	8								
		CO-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0	3								
		ALPHA-OLEFINS	1	1								
600	N-BUTYL ACETATE	BUTANOL ESTERIFICATION	3	3								
630	N-BUTYL ACRYLATE	MODIFIED FEFF	1	1	X						X	
		BUTANOL AND ACRYLIC ACID	1	4	X						X	
640	N-BUTYL ALCOHOL	OXO PROCESS	1	6	X							X
		CROTONALDEHYDE HYDROGENATION	1	2	X							X
650	S-BUTYL ALCOHOL	BUTENE HYDRATION	0	4					X			X
660	T-BUTYL ALCOHOL	BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	0	1								
		ISOBUTYLENE	2	1	X		X					X
670	N-BUTYLAMINE	BUTYRALDEHYDE	2	3	X							X
680	S-BUTYLAMINE	BUTANOL AND AMMONIA	1	3								
690	T-BUTYLAMINE	ISOBUTYLENE AND HCN	1	1								
700	P-T-BUTYL BENZOIC ACID	TOLUENE/ISOBUTYLENE OXIDATION	3	1								
710	1,3-BUTYLENE GLYCOL	ACETALDOL HYDROGENATION	3	3								
730	N-BUTYRALDEHYDE	OXO PROCESS	2	6	X							
760	BUTYRIC ACID	CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	0	1								
		N-BUTYRALDEHYDE OXIDATION	1	2		X						X
770	BUTYRIC ANHYDRIDE	BUTYRIC ACID AND KETENE	3	1								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES					PROCESS WATER DISPOSAL		
					CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
780	BUTYRONITRILE	PROPYL CHLORIDE AND HCN	3	1								
785	CAPROLACTAM	CYCLOHEXANONE	1	3	X						X	
790	CARBON DISULFIDE	METHANE AND SULFUR	1	5								
800	CARBON TETRABROMIDE	CCL4 AND HYROGEN BROMIDE	2	4								
810	CARBON TETRACHLORIDE	CARBON DISULFIDE CHLORINOLYSIS	1	1								
		METHANE CHLORINATION	1	5								
		HYDROCARBON CHLORINOLYSIS	1	3								
820	CELLULOSE ACETATE	CELLULOSE ESTERIFICATION	1	5			X					X
840	CHLOROACETIC ACID	ACETIC ACID CHLORINATION	1	4		X						X
850	M-CHLOROANILINE	CHLORONITROBENZENE	3	1								
860	O-CHLOROANILINE	CHLOROACETANILIDE ACIDIFICATION	3	2								
870	P-CHLOROANILINE	CO-PRODUCT OF OCPDB NO. 860	0	2								
880	CHLOROBENZALDEHYDE	P-CHLORO TOLUENE	3	1								
890	CHLOROBENZENE	BENZENE CHLORINATION	1	5								
		BENZENE CHLORINATION	1	1		X					X	
900	CHLOROBENZOIC ACID	CHLOROTOLUENE CHLORINATION/HYDROLYSIS	2	2					X		X	
905	CHLOROBENZOTRICHLORIDE	NO U.S. PRODUCERS	0	0								
910	CHLOROBENZOYL CHLORIDE	CHLOROBENZOIC ACID	3	1								
920	CHLORODIFLUOROETHANE	DIFLUROETHANE CHLORINATION	2	3		X					X	
921	CHLORODIFLUOROMETHANE	CHLOROFORM FLUORINATION	1	8		X					X	
930	CHLOROFORM	CO-PRODUCT OF OCPDB NO. 810 PROCESS 2	0	3								
		METHYLCHLORIDE CHLORINATION	1	6								
940	CHLORONAPTHALENE	NO U.S. PRODUCERS	0	0								
950	O-CHLORONITROBENZENE	CHLOROBENZENE NITRATION	3	2								
951	P-CHLORONITROBENZENE	CO-PRODUCT OF OCPDB NO. 950	0	2								
960	CHLOROPHENOLS (O,M,P)	PHENOL CHLORINATION	3	5								
964	CHLOROPRENE	BUTADIENE CHLORINATION	1	3								
965	CHLOROSULFONIC ACID	NOT AN ORGANIC	1	0								
970	M-CHLOROTOLUENE	NO U.S. PRODUCERS	0	0								
980	O-CHLOROTOLUENE	TOLUENE CHLORINATION	2	1								
990	P-CHLOROTOLUENE	CO-PRODUCT OF OCPDB NO. 980	0	1								
992	CHLOROTRIFLUOROMETHANE	CHLORODIFLUOROMETHANE PYROLYSIS	2	3		X					X	
1000	M-CRESOL	PETROLEUM EXTRACTANT	0	1								
		COAL TAR DISTILLATE	0	1								
1010	O-CRESOL	COAL OR PETROLEUM DERIVATIVE	0	5								
		PHENOL METHYLATION	3	1								
1020	P-CRESOL	TOLUENE SULFONATION	3	1								
1021	MIXED CRESOLS	PHENOL METHYLATION	3	2								
		PETROLEUM DERIVATIVES	0	4								
1030	CRESYLIC ACID	COAL TAR DERIVATIVE	0	2								
		PETROLEUM DERIVATIVE	0	6								
		CO-PRODUCT OF OCPDB NO. 1021 PROCESS 1	0	2								
1040	CROTONALDEHYDE	ACETALDEHYDE CONDENSATION	2	2								
1050	CROTONIC ACID	CROTONALDEHYDE OXIDATION	2	1	X						X	
1060	CUMENE	BENZENE ALKYLATION	1	13								
1070	CUMENE HYDROPEROXIDE	CUMENE OXIDATION	1	13								
1080	CYANOACETIC ACID	SODIUM CHLOROACETATE	3	1								
1090	CYANOGEN CHLORIDE	HCN CHLORINATION	3	1								
1100	CYANURIC ACID	UREA PYROLYSIS	0	2								
1110	CYANURIC CHLORIDE	CYANOGEN CHLORIDE	3	4			X		X			X
1120	CYCLOHEXANE	BENZENE HYDROGENATION	1	10								
		PETROLEUM DERIVATIVE	0	2								
1130	CYCLOHEXANOL	CYCLOHEXANE OXIDATION	1	6								
		PHENOL HYDROGENATION	1	3								
1140	CYCLOHEXANONE	CO-PRODUCT OF OCPDB NO. 1130 PROCESS 1	0	6								
		CO-PRODUCT OF OCPDB NO. 1130 PROCESS 2	0	1								
1150	CYCLOHEXENE	CYCLOHEXANOL DEHYDRATION	3	2								
1160	CYCLOHEXYLAMINE	ANILINE HYDROGENATION	2	4								
1170	CYCLOOCTADIENE	BUTADIENE DIMERAZATION	3	1								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES					PROCESS WATER DISPOSAL		
					CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
1180	DECANOL	ALFOL	1	1	X							X
		MODIFIED ZIEGLER	1	1	X							X
		OXO PROCESS	1	1	X						X	
1190	DIACETONE ALCOHOL	ACETONE CONDENSATION	2	4								
1200	DIAMINOBENZOIC ACID	DINITROBENZOIC ACID	3	1								
1210	DICHLOROANILINE	DICHLORONITROBENZENE	2	3								
1215	M-DICHLOROBENZENE	DCB ISOMERIZATION	2	1								
1216	O-DICHLOROBENZENE	CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	0	7								
1220	P-DICHLOROBENZENE	CO-PRODUCT OCPDB NO. 890 PROCESS 1 OR 2	1	7								
1221	DICHLORODIFLUOROMETHANE	CCL4 HYDROFLUORINATION	2	10		X						
1240	DICHLOROETHYL ETHER	ETHYL ETHER CHLORINATION	3	2							X	
1244	DICHLOROETHANE (EDC)	ETHYLENE CHLORINATION	1	19							X	
1250	DICHLOROHYDRIN	CO-PRODUCT OF OCPDB NO. 2091	0	2			X	X			X	
1270	DICHLOROPROPENE	CO-PRODUCT OF OCPDB NO. 210	0	3								
1280	DICYCLOHEXYLAMINE	ANILINE HYDROGENATION	2	2								
1290	DIETHYLAMINE	CO-PRODUCT OF OCPDB NO. 1700	0	5								
1300	DIETHYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 1830	0	16								
1304	DIETHYLENE GLYCOL DIETHYL ETHER	NO U.S. PRODUCERS	0	0								
1305	DIETHYLENE GLYCOL DIMETHYL ETHER	DEG METHYL ETHER AND METHYL CHLORIDE	3	20								
1310	DIETHYLENE GLYCOL MONOBUTYL ETHER	ETHYLENE OXIDE AND BUTANOL	2	4	X						X	
1320	DIETHYLENE GLYCOL MONOBUTYL ETHER ACETATE	DEG BUTYL ETHER ESTERIFICATION	2	2	X							X
1330	DIETHYLENE GLYCOL MONOETHYL ETHER	ETHYLENE OXIDE AND ETHANOL	2	4	X						X	
1340	DIETHYLENE GLYCOL ETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	1	X							X
1360	DIETHYLENE GLYCOL MONO METHYL ETHER	ETHYLENE OXIDE AND METHANOL	2	6	X						X	
1420	DIETHYL SULFATE	ETHYLENE AND SULFURIC ACID	2	1	X							X
1430	DIFLUOROETHANE	ACETYLENE AND HYDROGEN FLUORIDE	2	2		X					X	
1440	DIISOBUTYLENE	ISOBUTYLENE	3	3								
		BUTYLENE EXTRACTION	0	2								
1442	DIISODECYL PHTHALATE	PHTHALIC ANHYDRIDE AND ISODECANOL	2	10								
1444	DIISOCTYL PHTHALATE	PHTHALIC ANHYDRIDE AND ISOOCTANOL	2	10								
1450	DIKETENE	DIMERIZATION OF KETENE	2	2								
1460	DIMETHYLAMINE	CO-PRODUCT OF OCPDB NO. 2530	0	5								
1470	DIMETHYL ANILINE	ANILINE AND METHANOL	3	3								
1480	DIMETHYL ETHER	METHANOL AND SULFURIC ACID	2	1		X						X
1490	DIMETHYL FORMAMIDE	DIMETHYAMINE AND CO	3	1								
		METHYL FORMATE AND DIMETHYLAMINE	3	2								
1495	DIMETHYL HYDRAZINE	DIMETHYLAMINE	3	1								
1500	DIMETHYL SULFATE	DIMETHYL ETHER AND SO3	2	2	X							X
1510	DIMETHYL SULFIDE	METHANOL AND HYDROGEN SULFIDE	3	3								
		LIGNIN DEMETHYLATION	3	1								
1520	DIMETHYL SULFOXIDE	DIMETHYL SULFIDE OXIDATION	2	2								
1530	DIMETHYL TEREPHTHALATE	P-XYLENE OXIDAITON	1	5								
1540	3,5 DINITROBENZOIC ACID	BENZOIC ACID NITRATION	3	4								
1545	DINITROPHENOL	CO-PRODUCT OF OCPDB NO. 2792	0	3								
1550	DINITROTOLUENE	TOLUENE NITRATION	1	5	X						X	
1560	DIOXANE	ETHYLENE GLYCOL	3	4								
1570	DIOXOLANE	ETHYLENE GLYCOL	2	1	X							X
1580	DIPHENYLAMINE	ANILINE CONDENSATION	2	3	X							X
1590	DIPHENYL OXIDE	CHLOROBENZENE/PHENOL/NAOH CONDENSATION	2	2								
1600	DIPHENYL THIOUREA	ANILINE CONDENSATION	2	2								
1610	DIPROPYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 3111	0	6								
1620	DODECENE	PROPYLENE POLYMERIZATION	3	9								
1630	DODECYLANILINE	DODECYL ALCOHOL	3	1								
1640	DODECYLPHENOL	PHENOL ALKYLATION	1	4			X					X
1650	EPICHLOROHYDRIN	PHENOL ALKYLATION	1	1			X					X
1660	ETHANOL	ALLYL CHLORIDE	0	3	X						X	
		ETHYLENE HYDRATION	1	6					X		X	
1661	ETHANOLAMINES	FERMENTATION	0	5								
		ETHYLENE OXIDE AMMONOLYSIS	1	4								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES					PROCESS WATER DISPOSAL		
					CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
1670	ETHYL ACETATE	ACETALDHYDE	3	3								
		POLYVINYL ACETAL	3	1								
		CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	0	2								
1680	ETHYL ACETOACETATE	DIKETENE AND ETHANOL	3	4								
1690	ETHYL ACRYLATE	MODIFIED REPP	1	1	X							
		ETHANOL AND ACRYLIC ACID	1	4	X						X	
1700	ETHYLAMINE	ETHANOL AMMONOLYSIS	1	5	X						X	
1710	ETHYLBENZENE	BENZENE ALKYLATION	1	10							X	
		XYLENES DISTILLATION	0	4								
1720	ETHYL BROMIDE	ETHYLENE AND HYDROGEN BROMIDE	2	2		X						
1730	ETHYL CELLULOSE	CELLULOSE AND CAUSTIC	1	3								X
1740	ETHYL CHLORIDE	ETHYLENE HYDROCHLORINATION	1	6								
1750	ETHYL CHLOROACETATE	CHLOROACETIC ACID ESTERIFICATION	3	1								
1760	ETHYL CYANOACETATE	CYANOACETIC ACID	2	2	X							
1770	ETHYLENE	REFINERY GASES	1	4			X					X
		NATURAL GAS LIQUIDS	1	27				X		X		
		HEAVY LIQUIDS	1	10				X		X		
1780	ETHYLENE CARBONATE	ETHYLENE OXIDE AND CO2	2	1	X							X
1790	ETHYLENE CHLOROHYDRIN	ETHYLENE AND HYPOCHLOROUS ACID	2	1								
1800	ETHYLENE DIAMINE	ETHYLENE DICHLORIDE AND NH3	2	4					X			X
1810	ETHYLENE DIBROMIDE	ETHYLENE BROMINATION	2	4								
1830	ETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION	1	11	X					X		
1840	ETHYLENE GLYCOL DIACETATE	ETHYLENE GLYCOL ESTERIFICATION	2	2	X							X
1870	ETHYLENE GLYCOL DIMETHYL ETHER	EGMAE AND METHYL CHLORIDE	2	1	X							
1890	ETHYLENE GLYCOL MONOBUTYL ETHER	ETHYLENE OXIDE AND N-BUTANOL	2	9	X						X	
1900	ETHYLENE GLY. MONOBUTYL ETHER ACETATE	ESTERIFICATION WITH A.A.	2	1	X						X	
1910	ETHYLENE GLYCOL MONOETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890	0	9								X
1920	ETHYLENE GLY. MONOETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	1	X							
1930	ETHYLENE GLYCOL MONOMETHYL ETHER	CO-MFG'D WITH OCPDB NO. 1890	0	9								X
1940	ETHYLENE GLY. MONOMETHYL ETHER ACETATE	ACETIC ACID ESTERIFICATION	2	1	X							
1960	ETHYLENE GLYCOL MONOPHENYL ETHER	ETHYLENE OXIDE AND PHENOL	2	1	X							X
1970	ETHYLENE GLYCOL MONOPROPYL ETHER	ETHYLENE OXIDE AND PROPANOL	2	1	X							X
1980	ETHYLENE OXIDE	ETHYLENE OXIDATION	1	14	X	X				X		X
1990	ETHYL ETHER	ETHANOL DEHYDRATION	2	2		X						
		BY-PRODUCT OF OCPDB NO. 1660 PROCESS 1	0	3								X
2000	2-ETHYLHEXANOL	OXO PROCESS	1	5	X							X
2010	ETHYL ORTHOFORMATE	HCN + ETHANOL + HCL	3	1								
2020	ETHYL OXALATE	OXALIC ACID ESTERIFICATION	3	2								
2030	ETHYL SODIUM OXALACETATE	ETHYL ACETATE	3	1								
2040	FORMALDEHYDE	METHANOL OXIDATION	1	53								
2050	FORMAMIDE	AMMONOLYSIS METHYL FORMATE	2	1								
2060	FORMIC ACID	CO-PRODUCT OF OCPDB NO. 70 PROCESS 4	0	2								
2070	FUMARIC ACID	BY-PRODUCT OF OCPDB NO. 2440	0	0								
		MALEIC ACID ISOMERIZATION	2	3								
		MALEIC ANHYDRIDE	2	1								
2073	FURFURAL	BY-PRODUCT OF OCPDB NO. 2960 (ALL PR.)	0	1								
2090	GLYCEROL	ACID HYDROLYSIS	2	6	X							X
		EPICHLOROHYDRIN	2	2				X		X		
		ALLYL ALCOHOL	2	1				X		X		
2091	GLYCEROL DICHLOROHYDRIN	GLYCIDOL	2	1				X		X		
2100	GLYCEROL HYDROXYISOPROPYL ETHER	ALLYLCHLORIDE CHLOROHYDRINATION	3	2								
2110	GLYCINE	GLYCEROL REACTED WITH PROPYLENE OXIDE	2	2			X					X
2120	GLYOXAL	AMMONOLYSIS OF CHLOROACETIC ACID	3	3								
2145	HEXACHLOROBENZENE	OXIDATION OF ACETALDEHYDE	3	2								
2150	HEXACHLOROETHANE	NO U.S. PRODUCERS	0	0								
2160	HEXADECYL ALCOHOL	CHLORINATION OF PERCHLOROETHYLENE	1	1								
		OXO PROCESS	2	1	X							X
2165	HEXAMETHYLENEDIAMINE	REDUCTION OF ESTERS	3	4								
		HYDROGENATION OF ADIPONITRILE	3	5								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES: CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	PROCESS WATER DISPOSAL: COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
2165	HEXAMETHYLENEDIAMINE	AMMONOLYSIS OF 1-6-HEXANEDIOL	3	1								
2170	HEXAMETHYLENEGLYCOL	REDUCTION OF DIETHYLADIPATE	3	1								
2180	HEXAMETHYLENE TETRAMINE	AMMONOLYSIS OF FORMALDEHYDE	3	6								
2190	HYDROGEN CYANIDE	REACTION OF AMMONIA, AIR, AND METHANE	3	9								
		BY-PRODUCT OF OCPDB NO. 170	0	0								
2200	HYDROQUINONE	REDUCTION OF QUINONE	1	1								
		CLEAVAGE OF DHP	1	1								
2210	P-HYDROXYBENZOIC ACID	ACIDIFICATION OF THE ACID SALT	3	2								
2240	ISOAMYLENE	DEHYDRATION OF ISOAMYL ALCOHOL	2	1			X					X
2250	ISOBUTANOL	OXO	2	7	X							X
2260	ISOBUTYL ACETATE	ESTERIFICATION OF ACETIC ACID	0	5								
2261	ISOBUTYLENE	DEHYDRATION OF T-BUTANOL	2	2			X					X
		DEHYDRATION OF T-BUTANOL FROM BYSTREAM	1	3			X					X
2270	ISOBUTRALDEHYDE	OXO	2	7	X							X
2280	ISOBUTYRIC ACID	AIR OXIDATION OF ISOBUTRALDEHYDE	3	1								
2290	ISODECANOL	OXO FROM NONENE	2	3	X							
2320	ISOOCTYL ALCOHOL	OXO FROM HEPTENE	2	2	X							X
2321	ISOPENTANE	PETROLEUM DERIVATIVE	0	0								X
2330	ISOPHORONE	CONDENSATION OF ACETONE	3	3								
2340	ISOPHTALIC ACID	AIR OXIDATION OF M-XYLENE	3	0								
2350	ISOPRENE	DEHYDROGENATION OF ISOAMYLENE	1	2								
		PETROLEUM DERIVATIVE	0	0								
2360	ISOPROPANOL	HYDROLYSIS OF PROPYL SULFATE	1	4		X						X
		BY-PRODUCT OF OCPDB NO. 3120 PROCESS 2	0	0								
2370	ISOPROPYL ACETATE	ISOPROPANOL ESTERIFICATION	3	2								
2390	ISOPROPYL ALCOHOL	AMMONOLYSIS OF ISOPROPYL ALCOHOL	3	4								
		AMMONOLYSIS OF KETENE	3	1								
2390	ISOPROPYL CHLORIDE	HYDROCHLORINATION OF ISOPROPYL ALCOHOL	2	1					X			X
2400	ISOPROPYL PHENOL	FRIEDEL CRAFTS	2	6		X						X
2410	KETENE	PYROLYSIS OF ACETIC ACID	1	6								
		UNSPECIFIED	0	2								
2414	LINEAR ALKYL SULFONATE	OLEUM SULFONATION OF LAB	1	37								
		SO3-AIR SULFONATION OF LAB	1	20								
		LIQUID SO3-SO2 SULFONATION OF LAB	1	4								
2417	LINEAR ALKYL BENZENE	BENZENE CHLORINATION/ALKYLATION	1	4								
		BENZENE DEHYDROGENATION/ALKYLATION	1	1								
2420	MALEIC ACID	BENZENE	3	2								
2430	MALEIC ANHYDRIDE	AIR OXIDATION OF BENZENE	1	7								
		AIR OXIDATION OF BUTANE	1	2								
		BY-PRODUCT OF OCPDB NO. 2960 (ALL PR.)	0	0								
2440	MALIC ACID	MALEIC ACID HYDRATION	1	2								
2450	MESITYL OXIDE	DEHYDRATION OF DIACETONE ALCOHOL	3	3								
2455	METANILIC ACID	REDUCTION OF BENZENE SULFONIC ACID	3	3								
2460	METHACRYLIC ACID	ACETONE CYANOHYDRIN	3	3								
2490	METHALLYL CHLORIDE	CHLORINATION OF ISOBUTYLENE	3	1								
2500	METHANOL	REFORMING NATURAL GAS	1	11								
2510	METHYL ACETATE	ESTERIFICATION OF METHANOL	3	8								
2520	METHYL ACETOACETATE	BY-PRODUCT OF OCPDB NO. 2410 PROCESS 1	0	0								
2530	METHYLAMINE	AMMONOLYSIS OF METHANOL	1	15								
2540	N-METHYLANILINE	REACTION OF ANILINE AND METHANOL	3	2								
2545	METHYL BROMIDE	HYDROBROMINATION OF METHANOL	2	3				X				
2550	METHYL BUTYNOL	REACTION OF ACETYLENE WITH ACETONE	3	1								
2560	METHYL CHLORIDE	METHANOL HYDRO-CHLORINATION	1	13				X			X	
		METHANE CHLORINATION	1	3		X					X	
2570	METHYL CYCLOHEXANE	REDUCTION OF TOLUENE	1	1								
2590	METHYLCYCLOHEXANONE	OXIDATION OF METHYL CYCLOHEXANOL	2	1	X							X
2620	METHYLENE CHLORIDE	METHYL CHLORIDE CHLORINATION	1	3								
		CO-PRODUCT OF OCPDB NO. 2560 PROCESS 2	0	0								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES					PROCESS WATER DISPOSAL		
					CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
2630	METHYLENE DIANILINE	CONDENSATION OF ANILINE AND FORMALDEHYDE	2	3			X					
2635	METHYLENE DIPHENYL DIISOCYANATE	PHOSGENATION OF DIPHENYLMETHANE AMINE	2	4		X						X
2640	METHYLETHYL KETONE	DEHYDROGENATION OF SEC-BUTANOL	1	5		X						X
		BY-PRODUCT OF OCPDB NO. 70 PROCESS 4	0	0								X
2645	METHYL FORMATE	PETROLEUM EXTRACTANT	0	0								
2650	METHYLISOBUTYLCARBINOL	ESTERIFICATION OF FORMIC ACID	1	1								
2660	METHYLISOBUTYL KETONE	MIBK HYDROGENATION	1	2								
2665	METHYL METHACRYLATE	MESITYLOXIDE HYDROGENATION	0	20								
2670	METHYL PENTANOL	ACETONE CYANOHYDRIN	1	4								
2690	ALPHA-METHYLSTYRENE	ACETYLENE AND 2-BUTANONE	3	2			X					X
		DEHYDROGENATION OF CUMENE	0	1								
2700	NAPHTHOLINE	BY-PRODUCT OF OCPDB NO. 2910 PROCESS 1	0	0								
2710	1-NAPTHALENE SULFONIC ACID	DEHYDRATION OF DIETHANOLAMINE	3	1								
2720	2-NAPTHALENE SULFONIC ACID	SULFONATION OF NAPTHALENE	1	2								
2730	ALPHA-NAPTHOL	SULFONATION OF NAPTHALENE	2	2			X					
2740	BETA-NAPTHOL	HYDROLYSIS OF NAPTHYLAMINE	2	2	X							X
2750	NEOPENTANOIC ACID	PEROXIDATION OF NAPTHALENE	2	1	X		X					X
2756	O-NITROANILINE	CARBOXYLATION OF ISOBUTYLENE	3	1								X
		AMMONOLYSIS OF CHLORONITROBENZENE	3	1								
2757	P-NITROANILINE	AMMONOLYSIS OF CHLORONITROBENZENE	3	2								
		CO-PRODUCT OF OCPDB NO. 2756 PROCESS 1	0	0								
2760	O-NITROANISOLE	CO-PRODUCT OF OCPDB NO. 2756 PROCESS 2	0	0								
2762	P-NITROANISOLE	ALKYLATION OF O-NITROPHENOL	3	1								
2770	NITROBENZENE	NO U.S. PRODUCERS	0	0								
2780	NITROBENZOIC ACID	NITRATION OF BENZENE	1	7			X			X		
		NITRATION OF BENZOIL ACID	2	1			X					X
2790	NITROETHANE	OXIDATION OF NITROTOLUENE	3	1								
2791	NITROMETHANE	NITRATION OF PROPANE	3	1								
2792	NITROPHENOL	CO-PRODUCT OF OCPDB NO. 2790	0	0								
2795	NITROPROPANE	NITRATION OF PHENOL	2	3			X					X
2800	NITROTOLUENE	CO-PRODUCT OF OCPDB NO. 2790	0	0								
		NITRATION OF TOLUENE	2	1			X					X
2810	NONENE	NITRATION OF TOLUENE	2	1			X					X
2820	NONYLPHENOL	CO-PRODUCT OF OCPDB NO. 1620	0	0								
		ALKYLATION OF PHENOL	1	8			X					X
2830	OCTYL PHENOL	ALKYLATION OF PHENOL	1	4			X					X
2840	PARALDEHYDE	ACETALDEHYDE CONDENSATION	1	1			X					X
2850	PENTAERYTHRITOL	FORMALDEHYDE AND ACETALDEHYDE	1	1			X					X
		FORMALDEHYDE AND ACETALDEHYDE	3	1								X
2851	N-PENTANE	PETROLEUM DERIVATIVE	0	0								
2855	1-PENTENE	PETROLEUM DERIVATIVE	0	0								
2860	PERCHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 810 PROCESS 3	0	0								
		ETHYLENE DICHLORIDE OXYCHLORINATION	1	1		X						
2882	PERCHLOROMETHYLMERCAPTAN	ETHYLENE DICHLORIDE CHLORINATION	1	3		X						X
2890	O-PHENETIDINE	CLASSIFIED AS A PESTICIDE	0	0								X
2900	P-PHENETIDINE	NO U.S. PRODUCERS	0	0								
2910	PHENOL	REDUCTION OF P-NITROPHENOL	3	1								
		CUMENE HYDRO-PEROXIDE CLEAVAGE	1	11								
		TOLUENE	3	1								
2920	PHENOLSULFONIC ACIDS	COAL TAR DERIVATIVE	0	0								
2930	PHENYLANTHRANILIC ACID	SULFONATION OF PHENOL	3	4								
2940	PHENYLENEDIAMINE	ANILINE+O-CHLOROBENZOIC ACID	3	1								
		AMMONOLYSIS OF O-DICHLOROBENZENE	3	4								
2950	PHOSGENE	REDUCTION OF NITRO-BENZENE	3	5								
2960	PHTHALIC ANHYDRIDE	CHLORINATION OF CARBON MONOXIDE	1	18								
		BASF	3	4								
		VON HEYDEN	3	4								
		SHERWIN WILLIAMS/BADGER	3	2								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES: CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	PROCESS WATER DISPOSAL: COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
2960	PHTHALIC ANHYDRIDE	OXIDATION OF NAPTHALENE	3	1								
2970	PHTHALIMIDE	AMMONOLYSIS OF PHTHALIC ANHYDRIDE	3	1								
2973	BETA-PICOLINE	ACETALDEHYDE + HCHO AND METHANOL	3	1								
		COAL TAR DERIVATIVE	0	0								
2976	PIPERAZINE	AMMONOLYSIS OF ETHANOLAMINES	3	2								
3000	POLYBUTENES	FRIEDEL CRAFTS POLYMERIZATION	3	6								
3010	POLYETHYLENE GLYCOL	ETHYLENE OXIDE HYDRATION/POLYMERIZATION	3	8								
3025	POLYPROPYLENE GLYCOL	POLY.OF PROPYLENE OX. AND PROPYLENE GLY.	3	9								
3043	PROPIONALDEHYDE	OXO	2	2	X							X
3046	PROPIONIC ACID	OXO	2	2	X							X
		BY-PRODUCT OF OCPDB NO. 70 PROCESS 4	0	0								
3070	N-PROPYL ALCOHOL	OXO	2	1	X							X
		OXIDATION OF PROPANE	3	1								
3075	PROPYLAMINE	NH3 + ALCOHOL, DEHYDRATION CATALYST	2	1		X						X
		NH3 + ALCOHOL + H2, DEHYDRATION CATALYST	2	1		X						X
		NH3+ALDEHYDE+H2, HYDROGENATION CATALYST	2	1		X						X
		HCN + OLEFIN	1	1				X				X
3080	PROPYL CHLORIDE	HYDROCHLORINATION OF PROPYL ALCOHOL	2	1				X				X
3090	PROPYLENE	BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0	0								
		REFINERY BY-PRODUCT	0	0								
3100	PROPYLENE CHLOROHYDRIN	HYDROCHLORINATION OF PROPYLENE	2	1		X						X
3110	PROPYLENE DICHLORIDE	BY-PRODUCT OF OCPDB NO. 3100	0	6								
3111	PROPYLENE GLYCOL	HYDRATION OF PROPYLENE OXIDE	3	6								
3120	PROPYLENE OXIDE	PROPYLENE CHLOROHYDRIN + BASE	1	5								
		ISOBUTANE PEROXIDATION	2	1	X						X	
		CO-PRODUCT OF OCPDB NO. 3230 PROCESS 2	0	0								
3130	PYRIDINE	CO-PRODUCT OF OCPDB NO. 2973 PROCESS 1	0	0								
3140	QUINONE	OXIDATION OF ANILINE	3	1								
		OXIDATION OF ANILINE	3	1								
3150	RESORCINOL	NEUTRAL. OF BENZENE DISULFONIC ACID	1	1				X				X
3160	RESORCYLIC ACID	RESORCINOL	3	2								
3170	SALICYLIC ACID	SODIUM PHENATE	3	4								
3180	SODIUM ACETATE	NEUTRALIZATION OF ACETIC ACID	2	9								
3181	SODIUM BENZOATE	NEUTRALIZAION OF BENZOIC ACID	2	7								
3190	SODIUM CARBOXYMETHYL CELLULOSE	CELLULOSE	1	4			X					X
		CELLULOSE	1	3								
3191	SODIUM CHLOROACETATE	NEUTRALIZAITON OF CHLOROACETIC ACID	2	1								
3200	SODIUM FORMATE	CARBONMONOXIDE + SODIUM HYDROXIDE	1	4								
3210	SODIUM PHENATE	NEUTRALIZATION OF PHENOL	1	6	X							X
3220	SORBIC ACID	OXIDATION OF 2,4-HEXADIENAL	3	1								
		KETENE + CROTONALDEHYDE	3	2								
3230	STYRENE	DEHYDROGENATION OF ETHYL BENZENE	1	0								
		ETHYL BENZENE HYDROPEROXIDE + PROPYLENE	5	1								
3240	SUCCINIC ACID	HYDROGENATION OF MALEIC ANHYDRIDE	2	3								
3250	SUCCINONITRILE	REACTING ACRYLONITRILE WITH HCN	3	1								
3251	SULFANILIC ACID	SULFONATION OF ANILINE	3	2								
3260	SULFOLANE	ADDITION OF SO2 TO BUTADIENE	3	2								
3270	TANNIC ACID	EXTRACTION FROM NATURAL SOURCES	0	6								
3280	TEREPHTHALIC ACID	OXIDATION OF P-XYLENE	1	3								
		HYDROLYSIS OF DMT	2	1								
3290	TETRACHLOROETHANES	NO U.S. PRODUCERS	0	0								
3300	TETRACHLOROPHTHALIC ANHYDRIDE	CHLORINATION OF PHTHALIC ANHYDRIDE	2	1		X						X
3310	TETRAETHYL LEAD	ALKYLATION OF LEAD	1	1	X							X
		ALKYLATION OF LEAD	1	4	X		X					X
		GRIGNARD-ELECTROLYSIS	2	1	X							X
3320	TETRAHYDRONAPTHALENE	HYDROGENATION OF NAPTHALENE	3	2								
3330	TETRAHYDROPHTHALIC ANHYDRIDE	BUTADIENE + MALEIC ANHYDRIDE	3	1								
3335	TETRAMETHYL LEAD	MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR1	0	0								
		MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR2	0	0								
		MULTIPLE PRODUCT WITH OCPDB NO. 3310 PR3	0	0								

Table A-7. (Continued)

OCPDB NO.	CHEMICAL	PROCESS	DATA QUALITY	NUMBER OF SITES	PROCESS WATER SOURCES					PROCESS WATER DISPOSAL		
					CONTACT CONDENSER	SCRUBBING	WASHING	QUENCH	OTHER	COOLING TOWER	AQUEOUS WASTE TREATMENT	UNKNOWN
3340	TETRAMETHYLENEDIAMINE	NO U.S. PRODUCERS	0	0								
3341	TETRAMETHYLETHYLENEDIAMINE	DICHLOROETHANE + DIMETHYLAMINE	3	4								
3349	TOLUENE	CO-PRODUCT OF OCPDB NO. 380 PROCESS 1	0	0								
		COAL TAR DERIVATIVE	0	0								
		BY-PRODUCT OF OCPDB NO. 1770 (ALL PR.)	0	0								
3350	TOLUENE 1,4, DIAMINE	HYDROGENATION OF DINITROTOLUENES	1	9	X	X						X
3354	TOLUENE 2,4, DIISOCYANATE	PHOSGENATION OF TOLUENEDIAMINE	1	9		X						X
3355	TOLUENE DIISOCYANATES (MIXTURE)	MULTIPLE PRODUCT WITH OCPDB NO. 3354	0	0								
3360	TOLUENE SULFONAMIDE	AMMONOLYSIS OF TOLUENE SULFONYL CHLORIDE	3	2								
3370	TOLUENE SULFONIC ACIDS	TOLUENE SULFONATION	3	7								
3380	TOLUENE SULFONYL CHLORIDE	TOLUENE AND CHLOROSULFONIC ACID	3	1								
3391	TOLUIDINES	REDUCTION OF NITROTOLUENES	3	2								
		HYDROGENATION OF NITROTOLUENES	3	2								
3399	TRICHLOROBENZENES	CHLORINATION OF DICHLOROBENZENE	3	4								
3495	1,1,1-TRICHLOROETHANE	HYDROCHLORINATION OF VINYL CHLORIDE	2	3								
		ETHANE CHLORINATION	1	1				X			X	
3400	1,1,2-TRICHLOROETHANE	CHLORINATION OF ETHYLENE DICHLORIDE	2	2								
3410	TRICHLOROETHYLENE	CO-PRODUCT OF OCPDB NO. 2860 PROCESS 2	0	0								
		CO-PRODUCT OF OCPDB NO. 2860 PROCESS 3	0	0								
3411	TRICHLOROFLUOROMETHANE	CO-PRODUCT OF OCPDB NO. 1221	0	0								
3429	1,2,3 TRICHLOROPROPANE	CHLORINATION OF PROPYLENE	3	2								
3430	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	HYDROFLUORINATION OF PERCHLOROETHYLENE	1	3								
3450	TRIETHYLAMINE	CO-PRODUCT OF OCPDB NO. 1700	0	0								
3460	TRIETHYLENE GLYCOL	CO-PRODUCT OF OCPDB NO. 1830	0	0								
3470	TRIETHYLENE GLYCOL DIMETHYL ETHER	TRIETHYLENE GLY. MONOETHER+METHYLCHLOR.	3	1								
3495	TRIISOBUTYLENE	CO-PRODUCT OF OCPDB NO. 1440 PR 1 AND 2	0	0								
3490	TRIMETHYLAMINE	CO-PRODUCT OF OCPDB NO. 2530	0	0								
3560	UREA	ONCE THROUGH	1	14								
		PARTIAL SOLUTION RECYCLE	1	5								
		TOTAL RECYCLE	1	26								
3510	VINYL ACETATE	ACETYLENE AND ACETIC ACID	1	2		X					X	
		ETHYLENE AND ACETIC ACID	1	5		X					X	
3520	VINYL CHLORIDE	DEHYDROCHLORINATION OF EDC	1	13								
		HYDROCHLORINATION OF ACETYLENE	1	1								
3535	VINYLIDENE CHLORIDE	DEHYDROCHLORINATE 1,1,2-TRICHLOROETHANE	2	3								
3540	VINYL TOLUENE	TOLUENE + ETHYLENE	3	1								
3541	XYLENES (MIXED)	CO-PRODUCT OF OCPDB NO. 380 PROCESS 1	0	30								
		NAPTHA	0	0								
		COAL TAR DERIVATIVE	0	0								
3560	O-XYLENE	BY-PRODUCT OF OCPDB NO. 3541 (ALL PR.)	0	0								
3570	P-XYLENE	BY-PRODUCT OF OCPDB NO. 3541 (ALL PR.)	0	0								
3580	XYLENOL	BY-PRODUCT OF OCPDB NO. 1010 PROCESS 2	0	0								
3590	XYLIDINES	NITRATION OF MIXED XYLENE	3	3								

APPENDIX B

BATCH EMISSIONS CALCULATIONS

Calculations for Fig. 1

Acetone (56.5°C b.p.; 58 MW)

60° F (15.6°C)

V. P. = 148 mm Hg

1000 gal volume displaced

100% saturation

$$\frac{1}{379 \text{ SCF}} \times \frac{148 \text{ mm}}{760 \text{ mm}} \times 1 \times 58 \text{ MW} \times \frac{1000 \text{ gal}}{7.5 \text{ gal/CF}} = \underline{\underline{3.97}} \quad \frac{\text{lb - VOC}}{1000 \text{ gal displ. volume}}$$

Benzene (80.1°C b.p.; 78 MW)

60° F (15.6°C)

V.P. = 61 mm Hg

1000 gal volume displaced

100% saturation

$$\frac{1}{379 \frac{\text{SCF}}{\text{lb-mole}}} \times \frac{61 \text{ mm}}{760 \text{ mm}} \times 1 \times 78 \times \frac{1000 \text{ gal}}{7.5 \text{ gal/CF}} = \underline{\underline{2.2}} \quad \frac{\text{lb - VOC}}{1000 \text{ gal. displ. volume}}$$

Toluene (110.6°C b.p.; 92 MW)

60° F (15.6°C)

V.P. = 17 mm Hg

1000 gal volume displaced; 100% saturation

$$\frac{1}{379 \frac{\text{SCF}}{\text{lb-mole}}} \times \frac{17 \text{ mm}}{760 \text{ mm}} \times 1 \times 92 \text{ MW} \times \frac{1000 \text{ gal}}{7.5 \text{ gal/CF}} = \underline{\underline{0.72}} \quad \frac{\text{lb - VOC}}{1000 \text{ gal displ. volume}}$$

Benzene (80.1°C b.p.; 78 MW)

108°F (42.2°C)

V.P. = 200 mm Hg

1000 gal volume displaced

100% saturation

$$\frac{1}{379 \frac{\text{SCF}}{\text{lb-mole}}} \times \left(\frac{460 + 108°\text{F}}{460 + 60°\text{F}}\right) \times \frac{200 \text{ mm}}{760 \text{ mm}} \times 1 \times 78 \text{ MW} \times \frac{1000 \text{ gal}}{7.5 \text{ gal/CF}} = \underline{\underline{6.6}} \quad \frac{\text{lb - VOC}}{1000 \text{ gal displ. volume}}$$

Example for Fig. 1

If 4000 gal of acetone at 60°F is added to a vessel, determine the quantity of acetone (VOC) lost as displaced vapor if the vapor in the vessel is 60% saturated.

From Fig. 1, approximately 2.3 lb of acetone (VOC) per 1000 gal of displaced volume is lost. The total quantity of acetone lost is:

$$2.3 \text{ lb} \times \frac{4000 \text{ gal}}{1000 \text{ gal}} = \underline{\underline{9.2 \text{ lb}}}$$

Calculations for Fig. 2

Model compound = acetone

MW = 58; b.p. = 56.5°C (134°F)

Vapor pressure of acetone:

°F	°C	mm Hg
60	15.6	148
80	26.7	240
90	32.2	305
100	37.8	370

SCF = std. cu ft at 60°F and 30" Hg

Determine quantity of acetone (VOC) released per 100 SCF of noncondensable gases (NC) at 60°F, 80°F, 90°F and 100°F and 380 mm Hg, 760 mm Hg and 1520 mm Hg total pressure and 100% vapor saturation.

$$\frac{\text{lb-moles noncond. gases (NC)}}{100\ \text{SCF}} \times \frac{\text{Mole fraction VOC}}{\text{Mole fraction NC}} \times 58\ \text{MW} = \frac{\text{lb - VOC}}{100\ \text{SCF - NC}}$$

At 380 mm Hg total pressure (T.P.)

Temp °F	Moles NC per 100 SCF	Mole fraction VOC $\left(\frac{\text{V.P.}}{\text{T.P.}}\right)$	Mole fraction NC $\left(1 - \frac{\text{V.P.}}{\text{T.P.}}\right)$	lb - VOC/ 100 SCF - NC
60	$\frac{100}{379} \times \frac{520}{520} = 0.2639$	$\frac{148}{380} = 0.3895$	0.6105	9.8
80	0.2639	$\frac{240}{380} = 0.6316$	0.3684	26.2

Temp °F	Moles NC	Mole fraction VOC	Mole fraction NC	lb - VOC 100 SCF - NC
90	0.2639	$\frac{305}{380} = 0.8026$	0.1974	62.2
100	0.2639	$\frac{370}{380} = 0.9737$	0.0263	566.7

At 760 mm Hg total pressure

Temp. °F	lb - Moles NC per 100 SCF	Mole fraction VOC $\left(\frac{\text{V.P.}}{\text{T.P.}}\right)$	Mole fraction NC $\left(1 - \frac{\text{V.P.}}{\text{T.P.}}\right)$	lb - VOC/ 100 SCF - NC
60	$\frac{100}{379} \times \frac{520}{520} = 0.2639$	$\frac{148}{760} = 0.1947$	0.8053	3.7
80	0.2639	$\frac{240}{760} = 0.3158$	0.6842	7.1
100	0.2639	$\frac{370}{760} = 0.4868$	0.5132	14.5

Calculations for Fig. 2 (continued)

At 1520 mm Hg total pressure

Temp. °F	lb - moles NC		M.F. VOC		M.F. NC	lb - VOC / 100 SCF - NC
60	$\frac{100}{379} \times \frac{520}{520}$	= 0.2639	$\frac{148}{1520}$	= 0.9026		1.6
80		0.2639	$\frac{240}{1520}$	= 0.8421		2.9
100		0.2639	$\frac{370}{1520}$	= 0.7566		4.9

Example for Fig. 2

Determine the amount of acetone lost if 1000 SCF of noncondensable gas is vented from a distillation column under constant pressure (760 mm Hg) and temperature (100°F). Assume the vapor is 80% saturated.

From Fig. 2, approximately 12 lb of acetone (VOC) is lost per 100 scf of noncondensable gas vented. The total quantity of acetone lost is:

$$12 \text{ lb} \times \frac{1000 \text{ scf}}{100 \text{ scf}} = \underline{\underline{120 \text{ lb}}}$$

Calculations for Fig. 3

Basis: 100 CF gas volume ∿ 750 gal liquid
Model compound = acetone (134°F b.p.; 58 MW)

Temp. °F	Temp. °R	lb - Moles Gas $\left(\frac{100}{379 \times \frac{°R}{520}}\right)$	Mole fraction Acetone (VOC) $\left(\frac{V.P.}{760}\right)$	lb - Moles VOC	lb - Moles Air (NC)	% NC Purged
60	520	0.2639	$\frac{148}{760} = 0.1947$	0.0514	0.2125	0
70	530	0.2589	$\frac{190}{760} = 0.2500$	0.0647	0.1942	8.6
80	540	0.2541	$\frac{240}{760} = 0.3158$	0.0802	0.1739	18.2
90	550	0.2495	$\frac{305}{760} = 0.4013$	0.1001	0.1494	29.7
100	560	0.2450	$\frac{370}{760} = 0.4868$	0.1193	0.1257	40.8
110	570	0.2407	$\frac{450}{760} = 0.5921$	0.1425	0.0982	53.8
120	580	0.2366	$\frac{560}{760} = 0.7368$	0.1743	0.0623	70.7
130	590	0.2325	$\frac{680}{760} = 0.8947$	0.2080	0.0245	88.5
134	594	0.2310	$\frac{760}{760} = 1$	0.2310	0	100.0

Temp. °F	Based on 100 CF NC lb - Moles VOC	lb - Moles NC	lb - Moles VOC/ 100 SCF - NC	lb - VOC/ 100 SCF - NC
60	0.0638	0.2639	0.0638	3.7
70	0.0804	0.2412	0.0880	5.1
80	0.0996	0.2160	0.1217	7.1
90	0.1243	0.1855	0.1768	10.2
100	0.1482	0.1561	0.2505	14.5
110	0.1770	0.1220	0.3829	22.2
120	0.2165	0.0774	0.7382	42.8
130	0.2583	0.0304	2.24	129.9
134	0.2869	0	∞	∞

Grophical integration of area under purging curve between 0-90% vented NC yields about 52 lb - VOC/100 SCF-NC average.

Example for Fig. 3

Determine the total quantity of acetone (VOC) lost if a reactor originally at 60°F and 1 atmosphere pressure is heated at constant pressure to 120°F. Assume 500 scf of noncondensable gas saturated with acetone is vented.

From Fig. 3, using the vent gas temperature curve, approximately 70% of the original amount of noncondensable gases are vented when the reactor reaches 120°F.

From Fig. 3, using the vent gas VOC content curve, 70% vented equals 43 lb of acetone lost per 100 scf of noncondensable gas. The total quantity of acetone (VOC) lost is:

$$43 \text{ lb} \times \frac{500 \text{ scf}}{100 \text{ scf}} = \underline{\underline{215 \text{ lb}}}$$

Calculations for Fig. 4

A. Bases:

100 SCF noncondensable gases (NC) at 10 atm.

Pressure (original) at 10 atm. Let down to (final) at 1 atm.

Model compound = benzene at 100°F (MW = 78; V.P. = 170 mm Hg).

Pressure (atm.)	Vented (%)	Mole Fraction VOC (170/T.P.)	$\frac{\text{lb - VOC}}{\text{100 SCF - NC Vented}}$ $\left[\frac{\frac{\text{V.P.}}{\text{T.P.}} \times 78\ \text{MW} \times 100\ \text{SCF}}{1 - \frac{\text{V.P.}}{\text{T.P.}} \times 379\ \frac{\text{SCF}}{\text{lb-mole}} \times \frac{520}{520}}\right]$
10	0	0.0224	0.472
9	10	0.0249	0.525
8	20	0.0280	0.593
7	30	0.0320	0.681
6	40	0.0373	0.798
5	50	0.0447	0.963
4	60	0.0559	1.218
3	70	0.0746	1.659
2	80	0.1118	2.591
1	90	0.2237	5.931

B. Bases:

100 SCF noncondensable gases (NC) at 1 atm.

Pressure (original) at 1 atm. let down to (final) at 0.1 atm.

Model compound = toluene at 8°F (MW = 9 V.P. = 31 mm Hg).

Pressure (atm.)	Vented (%)	Mole Fraction VOC (31/T.P.)	$\frac{\text{lb - VOC}}{\text{100 SCF - NC Vented}}$ $\left[\frac{\frac{\text{V.P.}}{\text{T.P.}} \times 92\ \text{MW} \times 100\ \text{SCF}}{1 - \frac{\text{V.P.}}{\text{T.P.}} \times 379\ \frac{\text{SCF}}{\text{lb-mole}} \times \frac{520}{520}}\right]$
1	0	0.0408	1.032
0.9	10	0.0453	1.150
0.8	20	0.0510	1.303
0.7	30	0.0580	1.495
0.6	40	0.0680	1.772
0.5	50	0.0816	2.155
0.4	60	0.1020	2.757
0.3	70	0.1360	3.820
0.2	80	0.2040	6.220
0.15	85	0.2720	9.067
0.1	90	0.4080	16.730

Example for Fig. 4

Determine the total quantity of benzene lost if 2000 scf of benzene saturated noncondensable gas is vented from a vessel initially at 10 atmospheres pressure and 100°F temperature. Assume the vapor is 100% saturated and the final vessel pressure is 3 atmospheres.

From the right-hand side of Fig. 4, a pressure letdown from 10 atm to 3 atm pressure equates to 70% of the original noncondensable gases vented.

From the left-hand side of Fig. 4, if 70% of the noncondensable gases saturated with benzene are vented, the total quantity of benzene (VOC) lost is approximately 1.7 lb per 100 scf of noncondensable gas. The total quantity of benzene (VOC) lost is:

$$1.7 \text{ lb} \times \frac{2000 \text{ scf}}{100 \text{ scf}} = \underline{\underline{34 \text{ lb}}}$$

Calculations for Fig. 5

Wetted wall losses:

Loss factor = 0.0015 bbl/1000 ft^2 (see Chicago Bridge & Iron Co. Report).

Use fluid density = 7.5 lb/gal.

Use bbl = 42 gal.

$\therefore$ 0.0015 X 42 X 7.5 = 0.47 lb VOC loss/1000 ft^2.

Use vessel dimensions of L/D = 2.

Wetted area of vessel = sidewall + bottom.

$$\text{Volume} = \frac{\text{gal}}{7.5 \frac{\text{gal}}{\text{ft}^3}} = \frac{\pi D^2}{4} \times L = \frac{\pi D^2}{4} \times 2D$$

$$D^3 = \frac{\text{gal}}{7.5 \frac{\text{gal}}{\text{ft}^3}} \times \frac{2}{\pi}$$

$$\text{Area} = \pi D \cdot L \text{ (sidewall)} + \frac{\pi D^2}{4} \text{ (bottom)}$$

$$\pi D^2 \cdot 2 + \frac{\pi}{4} \cdot D^2$$

$$2\pi \cdot D^2 + \frac{\pi}{4} \cdot D^2$$

$$7.069 \cdot D^2$$

Vessel Volume (gal)	D (ft)	Area (ft^2)	VOC (lb)
500	3.49	86	0.041
1,000	4.39	136	0.064
2,000	5.54	217	0.102
5,000	7.52	400	0.189
7,500	8.60	523	0.247
10,000	9.47	634	0.300
20,000	11.93	1006	0.475
30,000	13.66	1319	0.623
40,000	15.03	1597	0.755
50,000	16.19	1853	0.876

Example for Fig. 5

A 40,000 gallon vessel has been completely filled and emptied with a volatile organic compound (VOC). Determine the amount of material (VOC) that is clinging to the vessel surfaces and that could be emitted as an emission when the vessel is opened.

From Fig. 5, a 40,000 gallon vessel has approximately 0.75 lb of VOC on its surfaces that could be emitted as an emission.